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ABSTRACT

The major goal of the Comprehensive Instructional Management System for mathematics is to provide the classroom teacher in New York City with a well-structured, objective-based curriculum. This first part of the manual for Level 3 includes modules for 14 topics: (1) numbers and numeration; (2) addition of whole numbers; (3) subtraction of whole numbers; (4) multiplication of whole numbers; (5) division of whole numbers; (6) fractions; (7) decimals; (8) integers; (9) geometry; (10) measurement; (11) algebraic concepts; (12) graphs, probability and statistics; (13) problem solving; and (14) review. The recommended instructional sequence is listed, followed by the content listed by topic. Reinforcement of previously learned skills is incorporated. Each objective is considered, with vocabulary, activities for getting started, and teaching strategies to use. The pupil's worksheets are interspersed. Resource materials, symbols, and equipment lists are included. (MNS)

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CIMS

COMPREHENSIVE INSTRUCTIONAL MANAGEMENT SYSTEM

A Cyclical Mathematics Curriculum

PART 1—TEACHER

NEW YORK CITY BOARD OF EDUCATION
OFFICE OF CURRICULUM DEVELOPMENT AND SUPPORT
DIVISION OF CURRICULUM & INSTRUCTION

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FOREWORD

The Comprehensive Instructional Management System (CIMS) is a unified mathematics curriculum for grades K-7. The curriculum is cyclical in design, and reflects the most recent New York City and New York State guidelines.

Utilizing the experience of our system's teachers, we have developed a teacher-designed curriculum that includes a rich selection of classroom-tested successful mathematics activities. The major goal of the CIMS mathematics project is to provide the classroom teacher with a well-structured, objective-based curriculum. All objectives are supported by a variety of strategies. Student mastery of these objectives is readily diagnosed through the system's testing component.

The curriculum format is structured to allow the teacher to determine the ability level of the students in the topic under study, and to permit the students to move forward at their individual rates. Each module of instruction provides the teacher with a set of related performance objectives. These objectives are supported by activities which probe and develop the students' readiness to undertake new skills and concepts. Further reinforcement is given to mastery of the objectives through accompanying student workbooks.

It is hoped that this curriculum will not only assist teachers in developing vital mathematics instruction, but will serve to expand and enrich students' mathematics skills.

Charlotte Frank

Charlotte Frank,
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INTRODUCTION

The Comprehensive Instructional Management System (CIMS) is a teacher-designed educational delivery system composed of a curriculum, a testing component and a computer managed reporting system.

Designed to support mathematics instruction in the classroom, CIMS provides a comprehensive cyclical mathematics curriculum for grades K through 7. Each manual describes the curriculum for a single level or grade. Teacher curriculum developers from elementary, intermediate and senior high schools utilized the most current New York City and New York State guidelines in formulating the curriculum's modules and sequence.

Curriculum Topics

The CIMS mathematics curriculum has been organized into the following 14 topics:

.01	Numbers and Numeration
.02	Addition of Whole Numbers
.03	Subtraction of Whole Numbers
.04	Multiplication of Whole Numbers
.05	Division of Whole numbers
.06	Fractions
.07	Decimals
.08	Integers
.09	Geometry
.10	Measurement
.11	Algebraic Concepts
.12	Graphs, Probability, Statistics
.13	Problem Solving
.14	Review

Modules of Instruction

The CIMS curriculum is organized into modules or groupings of similar skills or understandings. Each module has a suggested period of duration for student mastery, a listing of new skills to be mastered by the student in the form of performance objectives, a section devoted to vocabulary, terms and symbols, getting started activities which serve as prerequisite skills in preparation for undertaking new objectives, strategies for teaching the new skills and student activities for providing reinforcement for the newly learned objective. Note that the lesson duration is included only as a guideline to the teacher for planning purposes. The actual time required for each module will vary from class to class and from child to child depending on the needs of the students and the teacher's judgment.

Priorities of Performance Objectives

There is an order of priority to be recognized in teaching the content presented in the CIMS NEW YORK CITY MATHEMATICS CURRICULUM. Performance objectives with the greatest priority are so basic that unless the student acquires a satisfactory degree of competency in them, the student cannot progress. Such topics are marked A and mastery by all pupils is essential.

Performance objectives marked B are required to be presented to all students. Mastery is not expected at this time. These objectives will be developed further and reinforced later.

Performance objectives marked C are of special interest. These should be taught to increase positive attitudes towards mathematics.

Summary: A - Mastery of this objective is essential for progress. Opportunities for reinforcement should be provided throughout the school year.

B - These objectives are to be taught to all pupils. Mastery is not essential at this time because the topics will be further developed and reinforced.

C - Objectives of special interest.

REVISED
INSTRUCTIONAL SEQUENCE - LEVEL 3

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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REVISED
INSTRUCTIONAL SEQUENCE - LEVEL 3

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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REVISED
INSTRUCTIONAL SEQUENCE - LEVEL 3

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REVISED
INSTRUCTIONAL SEQUENCE - LEVEL 3

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03. Subtraction of Whole Numbers
04. Multiplication of Whole Numbers
05. Division of Whole Numbers
06. Fractions
07. Decimals
08. Integers
09. Geometry
10. Measurement
11. Algebraic Concepts
12. Graphs, Probability, Statistics
13. Problem Solving
14. Review

Module Coding Key

3.06.01.03 A

Grade level
(Grade 3)

Topic number
(.06 Fractions)

Module ranking within topic and level
(Fractions: Equivalent Fractions)

Performance objective within this module
(The student will be able to
compare and order like fractions.)

Priority
(See page xvi)

INSTRUCTIONAL SEQUENCE DESCRIPTION

An instructional sequence is given in list form on the following pages for this level. The sequence has been arranged to reflect what is considered the most effective presentation of the mathematics curriculum. Each module in the list is described by its unit number, module number, title, and page location.

The CIMS tests are integrated within the manual sequence. The test number is located in the first column. Each test is designed to assess priority objectives from the preceding modules. The tests are used to determine student mastery of specific performance objectives within these modules and appear in a multiple choice format. Each performance objective code number preceded by an * indicates that the performance objective is not tested on a CIMS cumulative test.

3.10.01 DAYS AND DATES ON A CALENDAR

(1-2 lessons/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

3.10.01.01A relate days and dates from a given calendar date;

e.g.,

1986 SEPTEMBER 1986

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

READ:

Tuesday, September 16, 1986 or 9/16/86

Today's date is September 16, 1986.
Yesterday's date was __________.
Tomorrow's date will be __________.
A week from Tuesday will be __________.

*3.10.01.02A identify number relationships among days, weeks, months and years;

e.g.,

7 days = 1 week
30 (31,28) days = 1 month
approx. 4 weeks = 1 month
12 months = 1 year
365 days = 1 year
366 days = 1 leap year

3.10.01.03A solve word problems related to skills learned in this module.

e.g.,

Use schedules indicating time, such as a monthly calendar of events, to answer questions.

November	
Election Day	11/4/86
Veteran's Day	11/10/86
Thanksgiving Day	11/27/86

If Election Day falls on a Tuesday, on what day will Veteran's Day fall?

3.10.01

VOCABULARY

TERMS

leap year	today	yesterday
date	tomorrow	

GETTING STARTED 1:

Prepare and display a page from a calendar for the current year and month. Say, "Why do we need a calendar?" Point to the name of the month, e.g., September. Say "What is the name of this month? How many months are in a year?" (There are 12 months in a year.) Ask the students to say the names of the months in order, beginning with January, as you write them on the chalkboard. Point to the names of the days of the week. Say, "Each box across the top has the name of one day of the week." Ask the students to recite the names of the days of the week. Write them on the chalkboard as you point to them. Say, "What information is on a calendar?" (A calendar shows the year, the months in the year, the names of the days of the week and the number of days in a week and in a month.)

GETTING STARTED 2:

Prepare and distribute a duplicated sheet which shows the days of the week and the months of the year in mixed order.

e.g.,

MAY	SUNDAY	NOVEMBER	MONDAY	JUNE
SEPTEMBER	JULY	TUESDAY	APRIL	FRIDAY
JANUARY	WEDNESDAY	MARCH	OCTOBER	AUGUST
THURSDAY	SATURDAY	FEBRUARY	DECEMBER	

Say, "This sheet has both the days of the week and the months of the year, but they are all mixed up." Distribute scissors and ask the students to cut and sort the names of the days of the week and the names of the months of the year into two separate groups. Say, "Construct a month line arranging the months of the year in order on your desk, beginning with January, the first month of the year."

e.g., January February March April...

Repeat this procedure with the days of the week.

3.10.01

3.10.01.01 **relate days and dates from a given calendar date**

STRATEGY 1: Distribute a blank calendar to each student. Say, "We know that a calendar has information about years, months, and days." Ask the students to fill in the name of the month in which this lesson is given, e.g., September, the names of the days of the week, and the numbers for each day. Say, "On what day does this month begin? (This month begins on a Monday.) We will use the calendar to locate dates. What is today's date? (Today's date is _____.) Ask a student to write the day and date on the chalkboard, e.g., Friday, September 12, 1986. Pointing to today's date on a large class calendar, say, "If we know that today is Friday, September 12, 1986, how can we use our calendars to find yesterday's date?" (We can find yesterday's day and date by looking at the name of the day and the number of the day that comes before today.) Ask a student to say yesterday's date and to write it on the chalkboard, e.g., Yesterday was Thursday, September 11, 1986.

Repeat this procedure for tomorrow's day and date by eliciting that tomorrow is the next day or the day after today. Use the same procedure to elicit that a week from today has the same name as today but it is 7 days from today. Say, "There is a shorter way to write these dates. To do this we give each month a number. What is the first month of the year? (The first month is January.) What number should be assigned to January? (The number 1 should be assigned to January.)...February?" (The number 2 should be assigned to February.) Using this procedure, how can you find a number for May?... August?... October?"

STRATEGY 1: cont'd

Say, "Since September is the ninth month of the year, another way to write today's date, September 12, 1986 is 9/12/86. Why do we write only the last 2 digits for 1986?" (Only the last two digits of the year are written because we know the first two digits are 19.) Repeat this procedure by asking the students to say and write yesterday's date, tomorrow's date and a week from today the short way. Say, "We will use your calendar to locate other dates. What is the date of the second Friday of this month?" Ask a student to write both forms of that date on the chalkboard. Repeat this procedure with other dates. Write 10/28/86 on the chalkboard. Say, "What does the 10 represent? (It represents the 10th month or October.)...28 represent? (It represents the 28th day of the month)...86 represent?" (It represents the year 1986.) Summarize this information on the chalkboard.

e.g.,

October, 10th month → 10/28/86 ← year: 1986
↑
28th day of the month

NOTE: The students should understand that the date does not include the name of the day of the week. The date only refers to the number of the day of the week, the month, and the year.

3.10.01.02 **identify number relationships among days, weeks, months, and years**

STRATEGY 1: Display a page from a calendar showing only the current year and month. "What are some of the words you use when measuring time on a calendar?" (We use days, weeks, months, and years to measure time on a calendar.) Point to the boxes with the names of the days of the week. Say, "If we count the number of boxes in each row, we know how many days there are in a week. How many days are in a week? (There are

STRATEGY 1: cont'd

seven days in a week). How many months are in a year if each page of the calendar represents a month of the year?" (There are 12 months in a year.) Ask the students to count the approximate number of full weeks in each month for several months. Elicit that each month has about 4 weeks with some additional days left over. Say, "Why do we say there are about 4 weeks in a month?" (There are 28 days in 4 weeks. Each month, except February, has either 30 or 31 days.) If we would count all the weeks in a year, we would count 52 weeks." Ask the students to look at the last number in each month to determine how many days there are in each month of the year. Write the months and the number of days next to them.

e.g.,

January-31 days
February-28 days
March-31 days...

Say the following rhyme to help the students remember the number of days in each month:

Thirty days has September, April, June
and November. All the rest have
thirty-one except February alone, to
which 28 we assign until leap year
gives it 29.

Say, "How can we figure out the number of days in a year? (We can add up all the days in each month.) The sum of all the days in each month is 365 days. There are 365 days in a year. How many days are in a leap year when February has 29 days?" (There are 366 days in a leap year.) Ask the students to complete the following chart on the chalkboard:

STRATEGY 1:
cont'd

1 week = _____ days
1 year = _____ months
1 year = _____ weeks
1 year = _____ days
1 leap year = _____ days

3.10.01.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and display a calendar for September and distribute a chart listing significant events for the month.

e.g.,

Special Day	Day of The Week	Date	Tomorrow's Date	Yesterday's Date	A Week From -
First Day of School					
Math Test 1		9/19/86		9/18/86	
Assembly					
Math Test 2	Friday				

Say, "On what day of the week did school begin? (School began on Monday.) On what date did school open?" (It opened on September 8, 1986.) Write Monday and 9/8/86 in the appropriate columns on the chart. Say, "Complete your chart for each special day and date by writing the name of the day of the week, the date, yesterday's date, tomorrow's date, and the date it will be one week from the special day. Use numbers only for the dates. If today is the day that school opened, what is tomorrow's date?... yesterday's date?... a week from 9/8/86? (Tomorrow's date is 9/9/86. Yesterday's date was 9/7/86. A week from 9/8/86 is 9/15/86.) Continue

STRATEGY 1: cont'd

this procedure to complete the other days and dates on the chart.

Extend the chart to include other special days in the month as suggested by the students, e.g., birthdays, class trips, holidays.

NOTE: The dates on the chart will change each year. Dates should be revised for each year.

STRATEGY 2:

Prepare and display a large calendar of the current month. Say, "If today is September 20th, how many more days are there until the end of the month? (There are 10 more days until the end of the month.) If David goes to the library on September 14th and again on September 25th, how many days are there between the two visits?" (There are 10 days between the visits). Put the calendar away. Say, "We will now use some of the information we have learned about the calendar to solve these problems. How many months are there in 3 years?...4 years?...7 years? (There are 36 months in 3 years, 48 months,...84 months.) How many days are there in 4 weeks?...6 weeks?...10 weeks? (There are 28 days in 4 weeks, 42 days...70 days...) If Susan was born on January 10, 1978 and Ruth was born on March 2, 1978, who is older?...younger? Explain." (Susan is older because she was born before Ruth. January comes before March.)

P.O. 3.10.01.01 & .03

NAME:______________________________ CLASS:__________ DATE:________

Use the calendar to answer the questions.

1986 SEPTEMBER 1986

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Labor Day 1	2	3	4	5	6
7	School Opens 8	9	10	11	12	13
14	15	16	17	18 Assembly	19	20
21	22	23	24	25	26	27
28	29	30				

1. The dates 9/3/86, 9/10/86, 9/17/86, and 9/24/86 are all on the same day of the week. On which day of the week is each date?

____

2. Write the date September 8, 1986 using numerals only. __________

3. Our first assembly will be on 9/18/86. The next assembly will be one week later. On what date will the next assembly take place? Write the answer using two forms.

______________________ ______________________

4. If today is September 13, 1986, what is tomorrow's date?

____

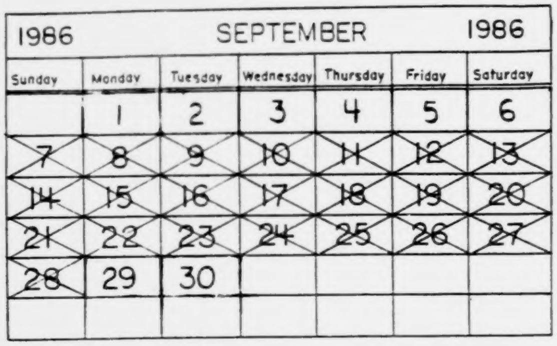
5. If today is September 23, 1986, what was yesterday's date?

____

P.O. 3.10.01.02-.03

NAME: ______________________ CLASS: __________ DATE: ________

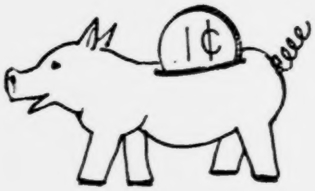
Follow the directions below.



1986			SEPTEMBER			1986
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
~~7~~	~~8~~	~~9~~	~~10~~	~~11~~	~~12~~	~~13~~
~~14~~	~~15~~	~~16~~	~~17~~	~~18~~	~~19~~	~~20~~
~~21~~	~~22~~	~~23~~	~~24~~	~~25~~	~~26~~	~~27~~
~~28~~	29	30				

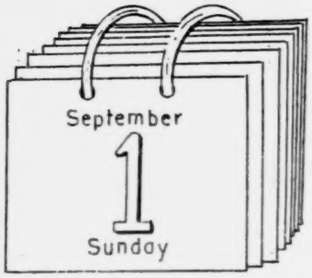
Henry marks an X on the calendar at the end of each day. For how many weeks has Henry been doing this?

____



Ernie saved a penny each day during the year. Today is the last day of the year. How many pennies did he save this year?

____



Look at a wall calendar. If today is September 1, 1986, how many months have passed this year?

____

If true, make a happy face. ☺
If not true, make a sad face. ☹

☺ 7 days = 1 week

○ 12 months = 1 year

○ 365 days = 1 year

○ 366 days = 1 leap year

○ 12 weeks = 1 month

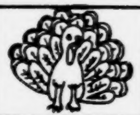
○ 52 weeks = 1 year

P.O. 3.10.01.03

NAME: ______________________ CLASS: ________ DATE: ________

Use the calendar to help you answer the questions.

1986 NOVEMBER 1986

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						~~1~~
~~2~~	~~3~~	~~ELECTION 4 DAY~~	~~5~~	~~6~~	~~7~~	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26		28	29
30						

1. Kevin marks an X at the end of each day on the calendar.
On which day of the week is the last X? ______________
What is the date? ____________

2. If today is 11/6/86, in how many weeks will it be Thanksgiving? _____

3. On what day of the week is Election Day? ____________

4. The doctor gave Mr. Brutus his check-up on November 11.
He must return 2 weeks later.
On what date must he return? ____________

5. Sarah's birthday is November 20.
Jane's birthday is two weeks before Sarah's.
What is the date of Jane's birthday? ____________

3.14.01 BASIC ADDITION AND SUBTRACTION FACTS

(1 lesson/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

3.14.01.01 recall addition facts through 18;
e.g.,
9 + 7 = 16
7 + 9 = 16

3.14.01.02 recall subtraction facts through 18.
e.g.,
17 - 9 = 8
17 - 8 = 9

VOCABULARY

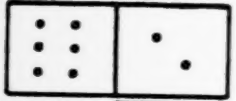
TERMS

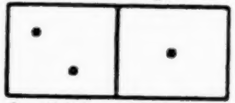
sum
difference
vertical
horizontal

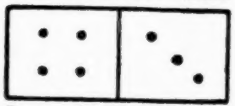
GETTING STARTED 1:

Prepare and distribute 18 discs (beans, buttons, sticks) to each student or group of students. Prepare several domino cards.

e.g.,

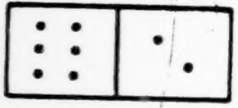






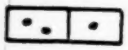
Write 6 + 2 = ☐ on the chalkboard and display the domino card for 6 + 2.

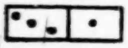
e.g.,

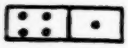


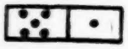
Say, "Arrange your discs to match the number story for 6 + 2 = ☐ and find the sum." Ask a student to write the correct sum on the chalkboard. Write several number sentences on the chalkboard and display their matching domino cards.

e.g.,

2 + 1 = ☐ 

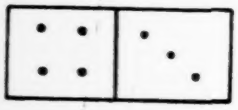
3 + 1 = ☐ 

4 + 1 = ☐ 

5 + 1 = ☐ 

Say, "Arrange your discs to match these number sentences. What is the sum of two plus one? (Two plus one equals three.) What is the sum of three plus one? (Three plus one equals four.) Each time the first addend is increased by 1 and the second addend is 1, the sum is 1 more than the original number. Do you see a pattern? What is the sum when one is added to a number?" (The sum is one more than the number.) Repeat this procedure when adding zero. Display a domino card for 4 + 3 = 7 or 3 + 4 = 7.

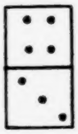
e.g.,



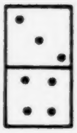
GETTING STARTED 1: cont'd

Say, "How can this domino card tell two addition number stories?" (The domino card shows 4 + 3 = 7. If it is turned the other way, it shows 3 + 4 = 7.) Does the sum change if the card is held vertically?" (The sum would be the same, but the example would be written vertically.)

e.g.,



$$\begin{array}{r} 4 \\ +3 \\ \hline 7 \end{array}$$



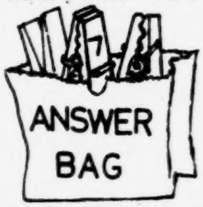
$$\begin{array}{r} 3 \\ +4 \\ \hline 7 \end{array}$$

GETTING STARTED 2:

Prepare and display two large cards, each showing several basic subtraction facts. Prepare clothespins on which are written the differences.

e.g.,

$$\begin{array}{rrr} 9 & 8 & 7 \\ \underline{-4} & \underline{-8} & \underline{-2} \end{array} \qquad \begin{array}{rrr} 9 & 6 & 5 \\ \underline{-6} & \underline{-4} & \underline{-1} \end{array}$$



Divide the class into two groups. Say, "One student from each group will take a clothespin from the answer bag. Each clothespin shows an answer or difference which matches a subtraction fact on the card. The student will pin the clothespin under the appropriate subtraction fact. The first group to complete its card is the winner."

Say, "If all the basic facts are different can the answers be the same?" (Yes, the difference between 9 and 4 and the difference between 7 and 2 are the same.)

e.g.,

$$\begin{array}{r} 9 \\ -4 \\ \hline 5 \end{array} \qquad \begin{array}{r} 7 \\ -2 \\ \hline 5 \end{array}$$

Say, "How can we check to determine if each difference is correct?" (The answers can be checked through the related addition facts.)

e.g.,

$$\begin{array}{r} 5 \\ +4 \\ \hline 9 \end{array} , \quad \begin{array}{r} 5 \\ +2 \\ \hline 7 \end{array}$$

3.14.01

3.14.01.01 **recall addition facts through 18**

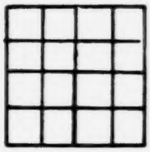
STRATEGY 1: Prepare and distribute workbook page 3a to each student. Say, "We have used discs (beans, buttons, sticks) to help us learn our addition facts. Today we will use an addition grid and a reverse "L" to recall addition facts. The numerals across the top of page 3a are written in a row. The numerals along the left side are written in a column. Place the reverse "L" on the addition table with the arrow pointing toward the sum of 8. Which addend is in the top row above the 8? (There is a three in the top row.) Which addend is in the column to the far left of the 8? (There is a five in the column to the far left of the 8.) How can you write a number sentence using those addends?"(3 + 5 = 8 or 5 + 3 = 8.)

Ask a student to write these number sentences on the chalkboard, e.g., 3 + 5 = 8, 5 + 3 = 8. Say, "Can you find another way to write these number sentences?" (Yes, I can write them vertically.) e.g.,

$$\begin{array}{r} 3 \\ +5 \\ \hline 8 \end{array} \qquad \begin{array}{r} 5 \\ +3 \\ \hline 8 \end{array}$$

Say, "How are they similar? (The sums are the same.) How are they different?" (One is written vertically and one is written horizontally.) Repeat this procedure with other students.

STRATEGY 2: Prepare addition flash cards for addition facts through 18, one blank square sheet of paper, and 16 markers for each student. Distribute the paper and the markers. Say, "We are going to play Addition Bingo". Ask the students to fold the paper into sixteen boxes. e.g.,



STRATEGY 2: cont'd

Ask the students to write selected numbers from 0 through 18 in each box. They may write the same number more than once. Using addition flash cards, display one card at a time. Say, "If you find the sum of these numbers on your sheet, cover it with a marker." Continue this procedure until one student has four boxes covered horizontally, vertically, or diagonally. Repeat the game until sufficient practice has been given. The winner of each game will display the flash cards for the next game.

NOTE: The following activity is an extension of the above.

Say, "Let's pretend I lost some basic fact cards. They need to be replaced." Ask a student to write the basic addition fact which equals 18 on a blank card. Say, "Can you find another way to express this fact using 1-digit addends? (No, 9 and 9 are the only 1-digit addends which equal 18.) What if I lost all of the cards equal to the sum of 4? How many ways are there to write an addition fact for four?" (There are 5 ways to write the addition facts for 4.) Ask several students to write these facts on the chalkboard.

e.g.,

$4 + 0 = 4$ $3 + 1 = 4$ $2 + 2 = 4$

$0 + 4 = 4$ $1 + 3 = 4$

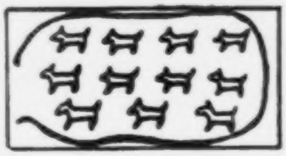
Say, "Using 1-digit addends, which number, through 18, has the most number facts?" (9 has the most number facts.) Ask the students to write all the number facts for 9. Say, "Using 1-digit addends, which number, through 18, has the fewest number facts?" (0 has the fewest number facts. It has only 1, $0 + 0 = 0$.)

3.14.01

3.14.01.02 recall subtraction facts through 18

STRATEGY 1: Prepare and display eleven felt "puppies" on a felt board and an "open fence" (yarn) around them.

e.g.,

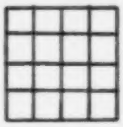


Say, "This is a story about a kennel owner who had 11 dogs in his yard. How many would be left if the fence were opened and 3 puppies ran away?" (Eight puppies would be left.) Ask a student to write the number sentence at the chalkboard which tells this story, e.g., 11 - 3 = 8.

Distribute discs (beans, buttons, sticks) and a "fence" (yarn) to each student or group of students. Say, "Place 12 "puppies" inside your fence. Now open the fence and let 4 puppies out." Write 3 number sentences on the chalkboard, e.g., 8 - 4 = 4, 12 - 4 = 8, 12 - 8 = 4. Say, "There were 12 puppies inside the fence. 4 puppies went outside the fence. Which number sentence tells this story? (12 - 4 = 8) How can you prove you are correct? (If 4 puppies returned, there would be 12 inside the fence.) How many puppies would be left inside the fence if all of them ran away?" (There would be none.) Ask a student to write the number sentence which tells this story. (12 - 12 = 0) Say, "Is the answer in a subtraction fact larger than, smaller than, or equal to the subtrahend or to the minuend? Explain." (The answer is smaller than or equal to the subtrahend or the minuend. For 3 - 2 = 1, the answer is smaller than the subtrahend and the minuend. For 4 - 2 = 2, the answer is smaller than the minuend and equal to the subtrahend.)

STRATEGY 2: Prepare subtraction flash cards for subtraction facts through 18, one blank sheet of paper and markers for each student. Say, "We have already played Addition Bingo. Now we will play Subtraction Bingo. Fold your paper into sixteen boxes."

e.g.,



Ask the students to write a number from 0 through 18 in each box. The same number may be written more than once. Display one subtraction flash card at a time. Say, "If you know the difference between these two numbers and that difference is on your sheet, cover it with a marker." Continue this procedure until one student has covered four boxes horizontally, vertically, or diagonally. The winner of each game may show the flash cards for the next game.

Say, "Let's pretend I lost some basic fact cards. The cards need to be replaced." Provide some blank cards and ask a student to write a basic subtraction fact which equals 8, e.g., 12 - 4 = 8. Say, "How many ways are there to write subtraction facts which equal 8?" Elicit and write 17 - 9 = 8 and 16 - 8 = 8 on the chalkboard. Say, "If 17 - 9 = 8 and 16 - 8 = 8, does 15 - 7 = 8? (Yes.) Do you see a pattern? Can you explain the pattern?" (The minuend and the subtrahend are reduced each time by 1.) Ask several students to continue writing the subtraction facts on the chalkboard, reducing the minuend and the subtrahend each time by 1.

e.g.,

Many Ways To Get To 8

17 - 9 = 8
16 - 8 = 8
15 - 7 = 8
14 - 6 = 8
13 - 5 = 8
12 - 4 = 8
11 - 3 = 8
10 - 2 = 8
9 - 1 = 8
8 - 0 = 8

P.O. 3.14.01.01

NAME:____________________ CLASS:________ DATE:_______

Refer to Strategy 1.

Cut out the addition table and the reverse L along the dotted lines.

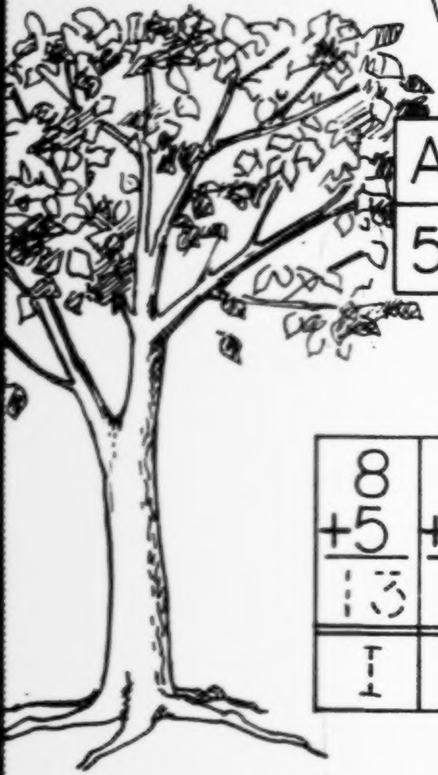
+	0	1	2	3	4	5	6	7	8	9
0										
1						6				
2										
3										
4		5								
5				8						
6										
7										
8					12					
9										

P.O. 3.14.01.01

NAME: ______________________ **CLASS:** __________ **DATE:** ________

Use the code to solve the riddle.

When does part of a tree drop to the ground?



A	E	F	H	I	L	M	N	S	T	U	V	W
5	14	6	11	13	16	10	15	8	7	12	17	9

8	7
+5	+8
13	
I	

5	6	8
+2	+5	+6

3	8	6	9	6	9
+2	+4	+1	+3	+4	+6

5	4	7	8
+4	+7	+7	+7

7	5	4	8	6	5
+9	+9	+1	+9	+8	+3

6	0	8	9
+0	+5	+8	+7

P.O. 3.14.01.02

NAME:____________________ CLASS:__________ DATE:________

Use the rule in each box to fill in the missing answers.

subtract 5	
12	7
10	5
7	2

subtract 8	
15	
16	
12	

subtract 7	
12	
14	
11	

subtract 9	
18	
14	
11	

subtract 6	
15	
12	
9	

12	
14	
10	

WRITE YOUR OWN

CHALLENGE!

Odd or even?

An odd number minus an odd number is an ________ number.

An even number minus an even number is an ________ number.

An odd number minus an even number is an ________ number.

An even number minus an odd number is an ________ number.

3.12.01 BAR GRAPHS

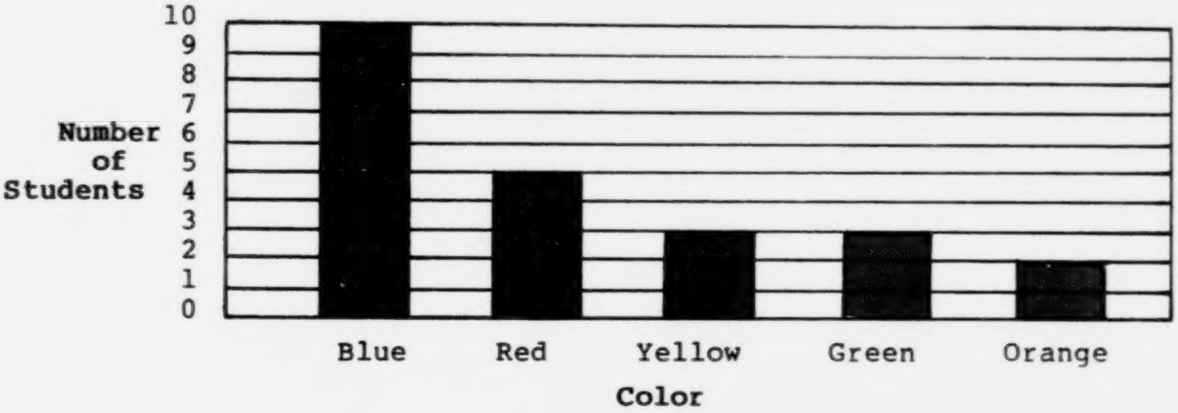
(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.12.01.01A read and interpret a bar graph; e.g.,

Our Favorite Colors



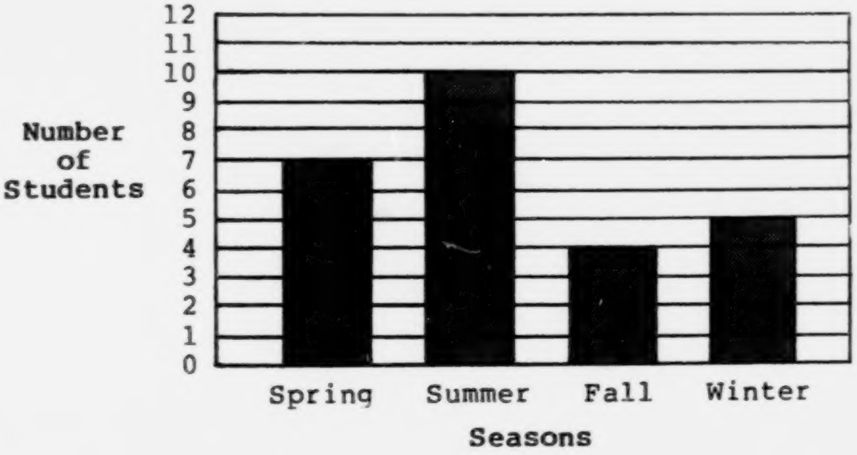
How many students liked red? Which were the favorite colors of an equal number of students?

*3.12.01.02A construct a bar graph.

e.g.,

Favorite Season	
Spring	𝍸 ||
Summer	𝍸 𝍸
Fall	||||
Winter	𝍸

Favorite Seasons



VOCABULARY

TERMS

bar graph
data
vertical axis
horizontal axis
tally

GETTING STARTED 1:

Say, "We will survey the students in our class to determine their favorite colors (flavors, television shows, desserts, school subjects)."

Ask one student to tally the information on the chalkboard as the students indicate their favorite colors.

e.g.,

Favorite Colors		Number of Students
Blue	𝍸 𝍸	10
Red	𝍸	5
Yellow	|||	3
Green	|||	3
Orange	||	2

Say, "We call these numbers data. What is the most popular color? (The most popular color is blue.) How do you know? (Blue was chosen by more students than any other color.) What is the least popular color? (Orange is the least popular color.) Do you know how many more students like red than yellow?" (Two more students like red than yellow.) Elicit questions from the students which are relevant to the above data.

e.g.,

Which colors were chosen by the same number of students?
How many students voted in all?

3.12.01

GETTING STARTED 2:

Prepare colored blocks in four colors and a label for each season of the year. Say, "We will survey the students in our class to determine their favorite seasons. What are the names of the seasons?" Write on the chalkboard, spring, summer, winter, and fall. Ask the students to vote for their favorite season. Ask a student to tally the votes next to the appropriate season on the chalkboard.

e.g.,

Favorite Season
Spring 𝍸 || = 7
Summer 𝍸 𝍸 = 10
Fall 𝍸 = 5
Winter 𝍸 = 5

Display the season labels. Display enough colored blocks so that each student may select one block according to his/her favorite season. Say, "Each color represents a different season. Red is for summer, green is for spring, blue is for winter, and yellow is for fall. When it is your turn, choose the appropriate color block and stack it in the column labeled with the name of your favorite season. Be sure that it is the same season for which you voted." When everyone has had a chance say, "Let's count each stack to make sure it is equal to our tally. Which season is the class's favorite? (Summer is the favorite season.) How do you know that summer is the favorite season?" (The red stack is tallest and has the most tally marks.) Continue the questioning to determine that spring is the second most favored season and that fall and winter are tied.

Say, "Which stack is the tallest?... shortest? How many blocks are in the shortest stack? How many more blocks are in the tallest stack than in the shortest stack."

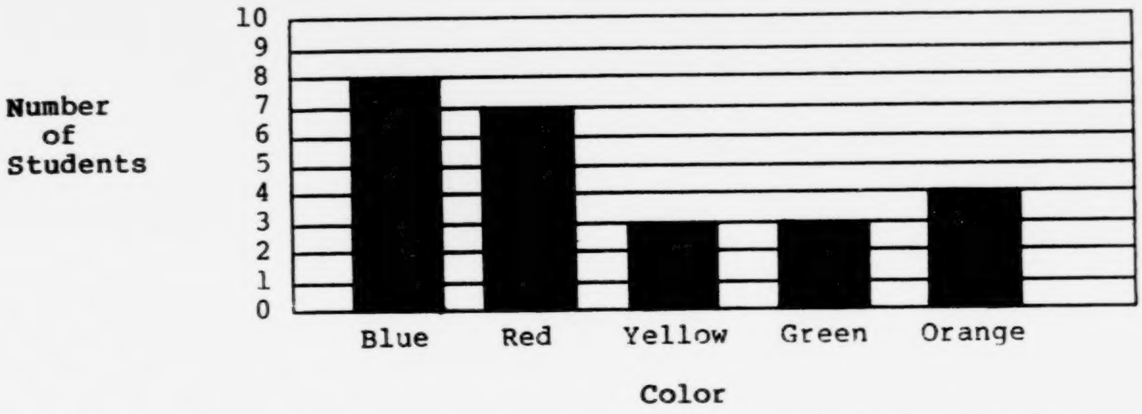
3.12.01

3.12.01.01 read and interpret a bar graph

STRATEGY 1: Prepare and display a bar graph.

e.g.,

Our Favorite Colors



Say, "We have used a tally to show data. Another way to show data is the bar graph." Point to the bar graph and say, "This is a bar graph. What is the title?" (The title is Our Favorite Colors.) Point to the horizontal axis and say, "What information can be found by reading the horizontal axis? (bottom) (The colors are listed along the horizontal axis.) What information is written along the vertical axis?" (The number of students who liked each color is written along the vertical axis.)

Say, "How many students chose red as their favorite color? (Seven students chose red as their favorite color.) Where did you find that information on the graph? (The bar for the color red stops at the number seven.) Which two colors were the favorites of an equal number of students?" (Yellow and green were chosen by an equal number of students.)

Ask other questions to elicit answers regarding the data on the graph.

NOTE: Students should have the opportunity to read and interpret horizontal as well as vertical bar graphs.

3.12.01

3.12.01.02 **construct a bar graph**

STRATEGY 1: Prepare one-inch graph paper. Distribute scissors and worksheet 4c to each student. Say, "Today we will construct a graph to find out where students in this class live. We will collect data (information). Find the house on your worksheet. Write the name or number of the street or avenue on which you live. (Demonstrate.) Using your scissors, cut out that section of your worksheet." (Demonstrate.) Collect all the completed street names and place them in a stack. Write all possible street names on the chalkboard. Ask several students to take turns tallying the results.

e.g.,

22nd Avenue	𝍸
Brown Street	𝍸 𝍸
Main Street	|||
5th Avenue	𝍸 𝍸 |
Maple Road	|||

Display the graph paper. Say, "We will make a graph of this data. What should we title our graph? (A good title is, The Streets Where We Live.) Where should we write the title?" (We will write the title at the top of the graph.) Ask a student to write the title in large letters at the top of the graph. Point to the vertical axis and say, "What should we write along the left side?" (We should write numbers for the number of students who live on each street.) Ask a student to write the numbers from 0 through 15 next to each line on the graph. Say, "What should we label this vertical axis?" (We should label it Number of Students.) Ask a student to label the vertical axis.

STRATEGY 1: cont'd

Repeat this procedure for the horizontal axis. Say, "Look at the tally marks. How many students live on 22nd Avenue?" (Five students live on 22nd Avenue.) Ask a student to fill in 5 boxes above 22nd Avenue. Repeat this procedure for all the streets. Say, "This bar graph helps us to compare the number of students living on different streets. What are some questions we could ask and answer by using this graph?" (Accept all reasonable responses.)

e.g.,

> Where do the greatest number of students live? (5th Avenue has the greatest number of students.) How many students live on 5th Avenue? (Eleven students live on 5th Avenue.)

Say, "What must always be included in a bar graph?" (A bar graph must have a title, bars, and labeled information about the graph along the left side (vertical axis) and the bottom (horizontal axis.) Record this information on the chalkboard.

NOTE: This strategy may be repeated with other pictures on worksheet 4c to gather data for other bar graphs.

STRATEGY 2: Prepare and distribute one inch (or 2cm) graph paper, a ruler and four crayons to each student. Say, "Let's look at the data we gathered about our favorite seasons. We will make a bar graph using this data. Why might we want to put this information on a bar graph? (The bar graph is an easy way to show comparisons.) What should we title our graph? (We should call it Our Favorite Seasons.) Where should we write the title?" (We should write the title above the graph.) Ask the students to write the title on their graph paper and to draw a horizontal and a vertical axis as you demonstrate at the chalkboard. Point to the horizontal and vertical

STRATEGY 2: cont'd

axes and say, "These lines are called the horizontal and the vertical axes. Number the vertical axis 0 through 10. What will this axis show? (It will show the number of students who like each season.) Label this axis, **Number of Students**. What information should we write along the horizontal axis? (We should write the name of each season.) Write each season under this axis. What should we label this axis?" (The horizontal axis should be labeled, **Seasons**.) Ask the students to use the tally information to color in a bar for each season as you demonstrate at the chalkboard. Say, "How many students liked summer best? (Eight students liked summer best.) How many more students liked summer than those who liked spring? (Four more students liked summer than those who liked spring.) How did you use the graph to get this information? (I found out how many students liked summer and how many students liked spring and subtracted to find the difference of 4.) Which was easier to read, the tally or the graph? Explain your answer." (Allow all reasonable responses.)

Continue asking questions regarding interpretation of the data on this graph. On the chalkboard write the parts of a bar graph and how they are used.
e.g.,

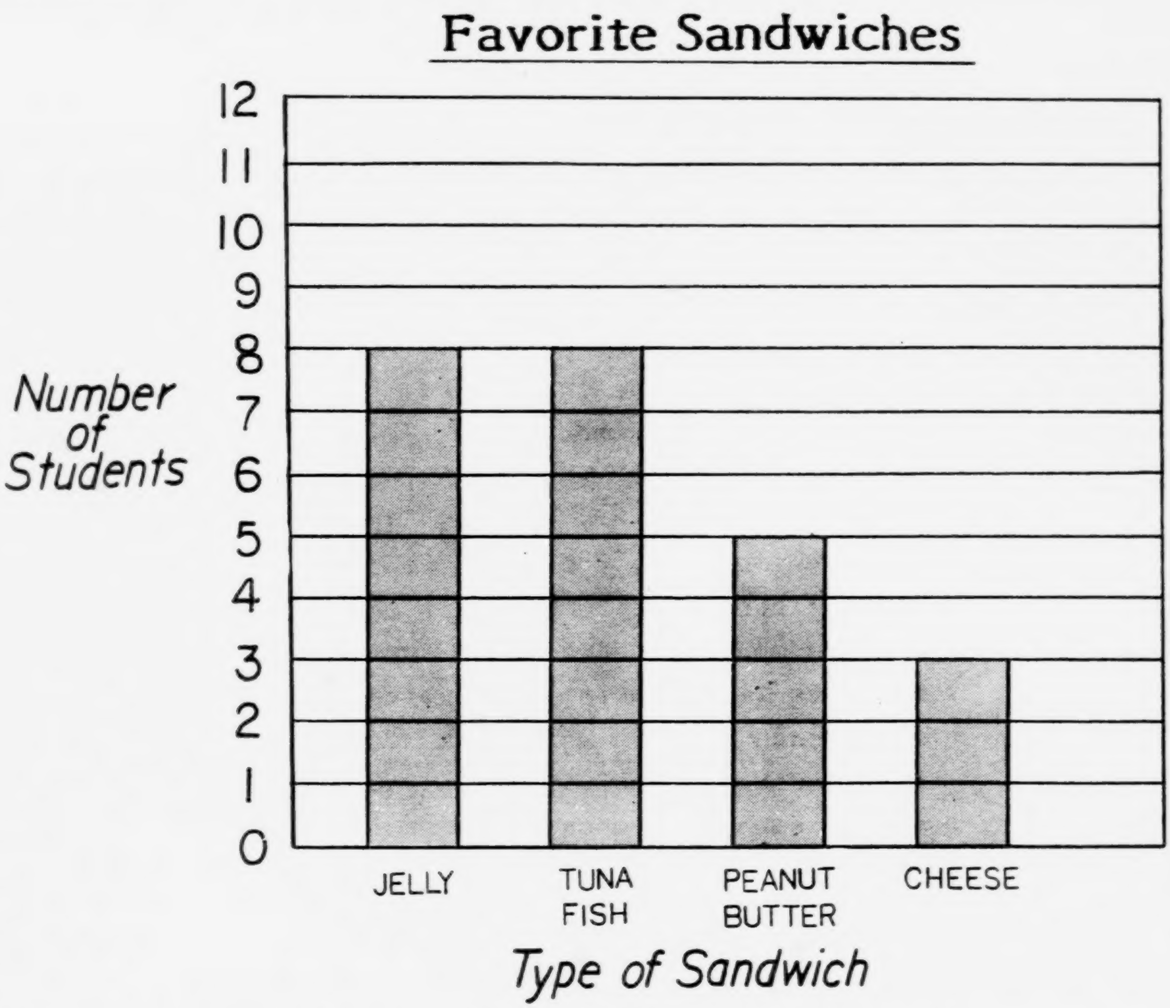
PARTS OF A BAR GRAPH

1. Title
2. Labeled vertical axis
3. Scale on vertical axis
4. Labeled horizontal axis
5. Bars

P.O. 3.12.01.01

NAME:____________________ CLASS:________ DATE:________

Use the graph to answer the questions.



1. How many students chose tuna fish as their favorite sandwich? ________
2. Which sandwich did five students like best? ____________________
3. Which was the least favorite sandwich? ____________________
4. Which sandwiches were the favorites of an equal number of students? ______

   ____

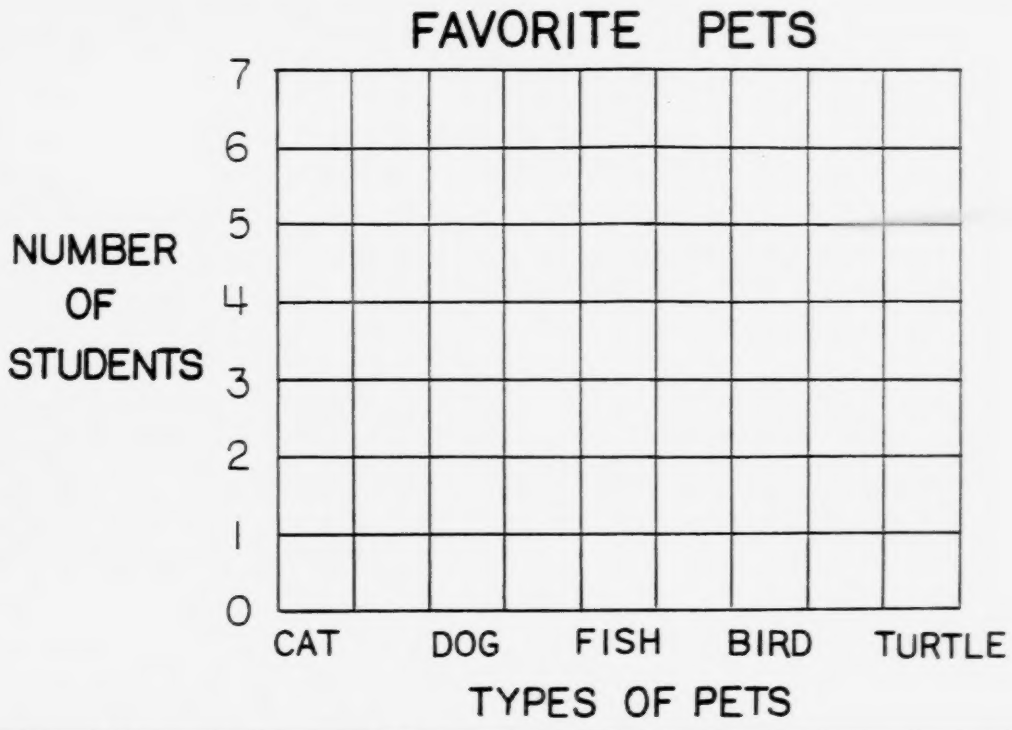
5. How many more students liked tuna fish than peanut butter? ________
6. How many students in all like jelly, tuna fish and cheese sandwiches? ________

P.O. 3.12.01.02

NAME:______________________________ CLASS:__________ DATE:________

Use the information in the tally to construct a bar graph.

FAVORITE PETS	TALLY OF THE NUMBER OF STUDENTS	NUMBER
CAT	~~////~~ /	6
DOG	~~////~~ //	
FISH	////	
BIRD	~~////~~ /	
TURTLE	///	



Do you remember?

1 pint = ________ cup(s)

1 quart = ________ pint(s)

2 pints = ________ quart(s)

1 quart = ________ cup(s)

2 cups = ________ pint(s)

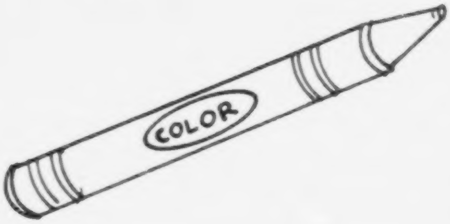
4 cups = ________ quart(s)

P.O. 3.12.01.02

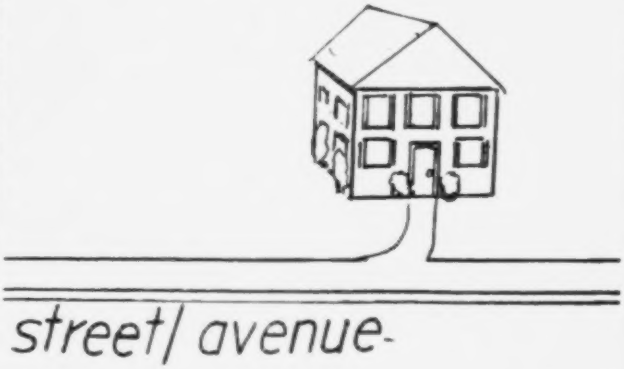
NAME:________________________ CLASS:________ DATE:________

Use these pictures with strategy 1 to gather data for graphs.

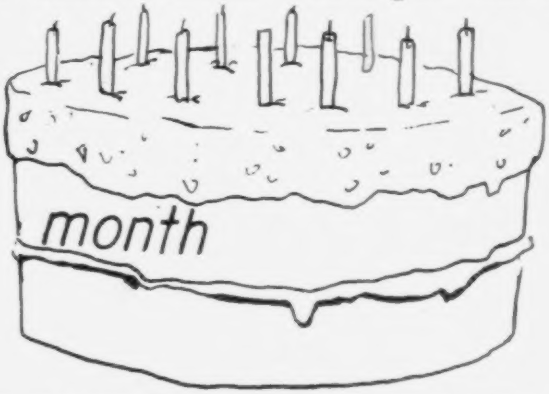
What is your favorite color?



Where do you live?

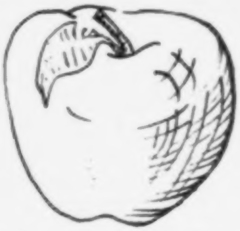


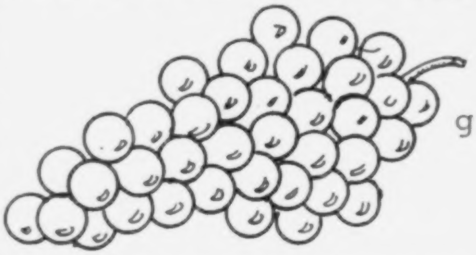
In which month were you born?



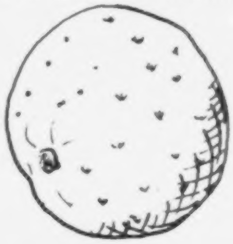
What is your favorite ice cream flavor?

Which is your favorite fruit?


apple


grapes

banana


orange

SHARPENING YOUR SKILLS

Units 1, 2, 3

Name: ______________________ **Class:** __________ **Date:** __________

Use the calendar below to answer questions 1 through 5.

OCTOBER						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

1. On which day of the week did the month begin?____________

2. On which day of the week will the month end?______________

3. What will the date be one week after October 9th?

ⓐ Oct. 2nd ⓒ Oct. 10th

ⓑ Oct. 8th ⓓ Oct. 16th

4. How much time is between October 4th and October 11th?

ⓐ one year ⓒ one week

ⓑ one month ⓓ 31 days

5. On which day of the week will November 1st be?

ⓐ Friday ⓒ Monday

ⓑ Saturday ⓓ Not given

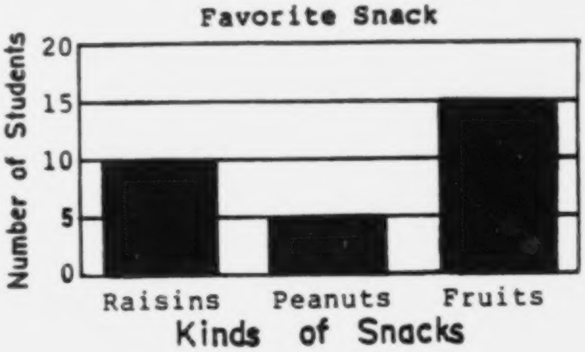
6. Complete the fact family.

8, 7, 15	
8+7= 15	15-7= 8
7+8= 15	

7. Complete the fact family.

8, 4, 12	
8+4= 12	

Use the graph to answer questions 8 through 10.



8. How many more students liked fruits than peanuts? _______

9. Which snack did 15 students vote for as their favorite?

____

10. How many students in all voted for their favorite snack?

ⓐ 10 ⓒ 15

ⓑ 5 ⓓ 30

Unit 4

3.10.02 MEASUREMENT - TIME

(2-3 lessons/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

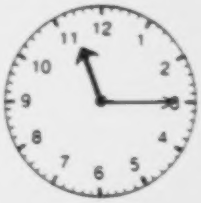
*3.10.02.01A identify relationships between seconds and minutes, and minutes and hours;

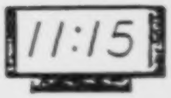
e.g.,

60 seconds = 1 minute
60 minutes = 1 hour

3.10.02.02A read and write time in terms of quarter hours on standard and digital clocks;

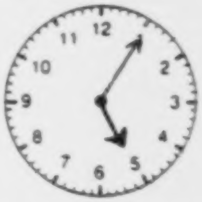
e.g.,





3.10.02.03B tell time by five minute intervals;

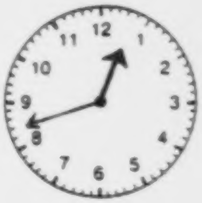
e.g.,



5:05

3.10.02.04B tell time by minute intervals (before, to, of the hour);

e.g.,



18 minutes before 1 o'clock.
18 minutes to 1 o'clock.
18 minutes of 1.

3.10.02.05A tell and record the time using A.M. and P.M.;

e.g.,

9:15 in the morning = 9:15 A.M.
6:45 in the evening = 6:45 P.M.

3.10.02.06B solve word problems related to skills learned in this module.

e.g.,

Jan leaves her house at 8:05 A.M.
Bill leaves his house at 8:46 A.M.
How many minutes earlier did Jan leave than Bill?

3.10.02

VOCABULARY

TERMS

A.M.
P.M.

GETTING STARTED 1:

Prepare and distribute to each student or group of students a small clock with movable hands. Display a large clock with movable hands. Say, "What do the hands on the clock tell us? (The long hand tells how many minutes have passed and the short hand tells how many hours have passed.)

Write 12:00, 12:30, 2:00, 2:30, 3:00, 3:30 on the chalkboard as the students use their clocks to show these times.

Ask the students to say the times displayed on their clocks.

GETTING STARTING 2:

Prepare and distribute to each student or group of students a copy of a television schedule. Say, "This is a schedule of TV programs for today. What is a schedule? Why are schedules useful? Who uses them?" Distribute the television schedule and ask questions about it. The questions should be confined to programs which begin and end on the hour or on the half hour.

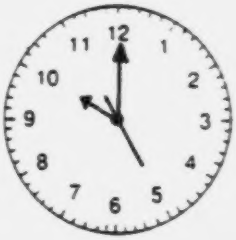
e.g.,

1. What time does a news program begin? ... end?
2. How long is The Muppet Show? ... The A-Team?
3. How many shows can you watch on Channel 2 between 8:00 and 10:00? ... on Channel 4?
4. If you watch show X and show Y, how much time will you spend watching television?

3.10.02

3.10.02.01 **identify relationships between seconds and minutes, and minutes and hours**

STRATEGY 1: Prepare and display a clock with movable hands which measures time in minutes and in seconds.
Show 10:00 on the clock.
e.g.,

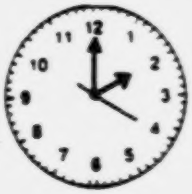


Say, "What time is it? (It is 10 o'clock.) What does the short hand tell us? (The short hand tells us the hour.) ...the long hand ...? (... the number of minutes past the hour.) What happens to the minute hand when the hour hand moves from 10 to 11? (The minute hand moves completely around the clock.) Each time the minute hand moves completely around the clock one hour has passed. How many minutes are in 1 hour?" (There are 60 minutes in 1 hour.) Ask the students to count by fives as a student slowly moves the minute hand completely around the clock. When 60 is reached say, "What has happened to the hour hand?" (It moved ahead 1 hour.) On the chalkboard write 60 minutes = one hour. Say, "What is a smaller measure of time than a minute? (A second is smaller than a minute.) When do we tell time in seconds? (Accept any appropriate answer, e.g., at a track event, at a rocket blast off.) The second hand moves much faster than the minute hand. (Demonstrate.) Ask the students to count by fives as a student moves the second hand around the clock. Say, "At what

STRATEGY 1: cont'd

number did we stop counting? (We stopped at 60.) How many seconds are there in one minute?" (There are 60 seconds in one minute.) Write on the chalkboard 60 seconds = 1 minute. Ask a student to show 2:00.

e.g.,



Say, "What time will it be if the hour hand moves to 3? (It will be 3 o'clock.) How many minutes have passed between 2 o'clock and 3 o'clock? (60 minutes have passed.) How many seconds does it take for the minute hand to move 1 minute?" (It takes 60 seconds.)

Ask the students to complete the following chart in their notebooks:

SPECIAL TIME FACTS

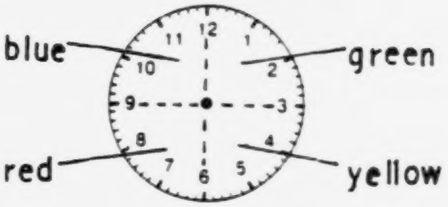
1 minute = _______ seconds
1 hour = _______ minutes
60 seconds = _______ minute
60 minutes = _______ hour

3.10.02.02 **read and write time in terms of quarter hours on standard and digital clocks**

STRATEGY 1: Prepare and display 2 demonstration clocks: a digital clock and a clock with movable hands. Distribute a small clock with hands to each student or group of students. (The students can make a paper plate clock with oak tag hands held with a paper fastener.) Divide a paper plate clock into 4 parts. Color each part a different color.

STRATEGY 1:
cont'd

e.g.,



Say, "Into how many parts did I divide the clock? (It is divided into 4 parts.) What fraction can we call each part? (Each part is one-fourth.) Another name for one-fourth is one quarter. When the minute hand is on the 3, how many quarter hours have passed?" (One quarter hour has passed.) Show 9:15 on the demonstration clock. Say, "What are some ways we can read the time on this clock?" (It is 9:15. It is 15 minutes past 9. It is a quarter after 9.) Ask a student to write all responses on the chalkboard. Show 9:45 on the clock and say, "How can we find out how many minutes past 9:00 o'clock it is?" (We can count the minutes from 12 to where the minute hand is pointing.) Ask the students to count by fives to see how many minutes past 9 it is. Elicit that it is 45 minutes past 9. Point to 9:15 on the chalkboard. Say, "How do you think we write 45 minutes past 9 if this is how we write 15 minutes past 9?" Ask a student to write 9:45 on the chalkboard. Say, "Is it closer to 9 o'clock or to 10 o'clock? (It is closer to 10 o'clock.) How many quarter hours are left before it turns to 10 o'clock? (There is one quarter hour left.) We can also say it is a quarter to 10." Write on the chalkboard: It is a quarter to 10. Say "How many minutes are left before the next hour?" (It is 15 minutes before 10 o'clock.) Ask the students to use their paper plate clocks to review a quarter to the hour and a quarter after the hour. Ask the students to write the various ways of saying the time on the quarter hour and summarize this information on the chalkboard.

STRATEGY 1:
cont'd

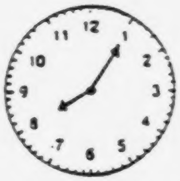
e.g.,

9:15	9:45
quarter after nine	quarter to 10:00
15 minutes past nine	15 minutes before 10:00

3.10.02.03 tell time by five minute intervals

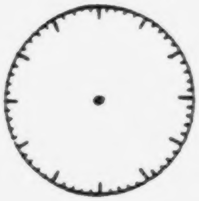
STRATEGY 1: Prepare and display a clock with movable hands.

e.g.,



Distribute a duplicated sheet to each student showing the outline of a clock with markings for 60 minutes on the face.

e.g.,



Say, "Where is the number 12 located on a clock?" (12 is at the top.) Ask the students to write 12 at the top of their clocks. Say, "There is a heavy line at the top near the 12. How many spaces are between 12 and the heavy line to the right? (There are 5 spaces.) What number belongs here? Explain." (For every 5 spaces on the clock we count 1 digit. The first number on a clock after 12 is 1. From number 1 to the next heavy line there are another 5 spaces. The next number should be 2.) Say, "Write the numbers from 1 to 11 in the appropriate places on your clocks." Set the hands on the demonstration clock at 9:00. Say, "What time is it?" (It is 9:00.) Set the hands of the demonstration clock to 9:05. Say, "Look at the clock on your worksheet.

STRATEGY 1:
cont'd

What does the minute hand tell us when it points to the 1? (It is 5 minutes after the hour.) What time is shown on the demonstration clock?" (It is 9:05 or 5 minutes after 9:00.)

Repeat this procedure by moving the minute hand around the clock in five minute intervals.

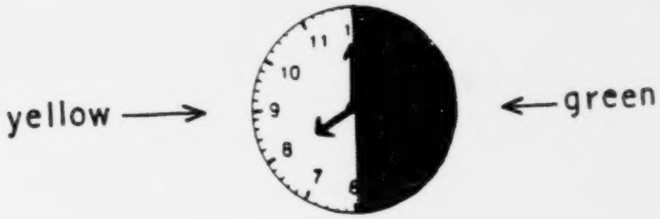
When the minute hand reaches 12, say, "How many minutes have passed? (Sixty minutes have passed.) How many minutes are in one hour? (There are 60 minutes in one hour.) Instead of saying 9:60 we say the next hour. What is the next hour after 9:00?" (The next hour after 9:00 is 10:00.)

3.10.02.04 **tell time by minute intervals (before, to, of the hour)**

STRATEGY 1: Distribute a duplicated sheet with the outline of a clock as suggested in P.O. 3.10.02.03, Strategy 1. Prepare and display a demonstration clock with movable hands. Set the hands at 9:05. Ask the students to identify and write the time. Repeat this procedure for other 5 minute intervals. Set the hands at 9:21 and say, "What time is it?" (It is one minute past 9:20. It is 9:21. It is 21 minutes after 9.)

Say, "Let's use a green crayon to color the space on our clocks between the 12 and the 6. Let's use a yellow crayon to color the space between the 6 and the 12." Demonstrate.

e.g.,



STRATEGY 1:
cont'd

Say, "When the minute hand points to the green half of the clock, as in 9:21, the time is after the hour." Set the clock to show 11:37. Say "What time is it? (It is 37 minutes past 11 o'clock or 11:37.) When the minute hand points to the yellow half of the clock, the time can be either before, of, to, or after the hour. We can count the minutes before the hour by starting from 12 and counting backward by fives. We can add on any minutes that are less than 5." Point to the clock which shows 11:37. Say, "How many minutes before 12 is it? (It is 23 minutes before 12 o'clock.) How do you know? (I counted backward by fives from 12 to get 20 minutes and then added 3 more minutes for a total of 23 minutes.) We can say that it is 23 minutes before 12 o'clock in several ways." Write this on the chalkboard.
e.g.,

It is 23 minutes before 12 o'clock.
It is 23 minutes to 12 o'clock.
It is 23 minutes of 12 o'clock.
It is 11:37.

Ask the students to draw a clock face in their notebooks, read each sentence, and write them in their notebooks. Repeat this procedure for other times before the hour.

3.10.02.05 **tell and record the time using A.M. and P.M.**

STRATEGY 1: Prepare a demonstration clock set at 7:30. Ask a student to say the time shown on the clock. Say, "What things do you usually do at 7:30? (Accept any appropriate response, e.g., eat breakfast, wake up, eat dinner.) How many hours are in a day? (There are 24 hours in a day.) A clock shows each hour two times each day. Therefore, 7:30 happens twice in 24

STRATEGY 1: cont'd

hours. There is a special way of noting whether we are talking about 7:30 in the morning or 7:30 in the evening. The time after midnight and before 12:00 noon is called A.M. The time after 12:00 noon but before midnight is called P.M." Write A.M. on a card and P.M. on another card. Set the demonstration clock to 9:00. Place the A.M. card next to the clock. Say, "What things are you doing from midnight to noon, the part of the day we call A.M.?" (Accept any appropriate event, e.g., sleeping, eating breakfast, leaving for school.) Place the P.M. card next to the clock. Ask the students to describe things they do from noon to midnight, the time we call P.M. (Accept any appropriate response, e.g., eating lunch, playing, doing homework.)

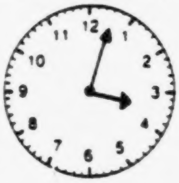
Repeat this procedure several times.

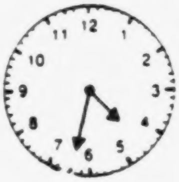
Summarize this experience by asking the students to list and say activities which take place in the A.M. or P.M. as you write them on the chalkboard.
e.g.,

Activities in A.M.	Activities in P.M.

STRATEGY 2: Prepare a chart and two demonstration clocks each with movable hands.

e.g.,





Say, "George starts work at 9 o'clock in the morning. He goes to sleep at 9 o'clock in the evening. Is 9 o'clock in the morning the same as 9 o'clock in the evening? (No, it is not the same.) What is different about them? (Accept any appropriate response.) When we talk about the time from midnight to noon, we say A.M. Can you say the time when George starts work so we know it is 9:00 in the morning?" (George starts

STRATEGY 2: cont'd

work at 9 A.M.) Under one clock write, George starts work at 9:00 A.M. Say, "When we talk about the time from noon to midnight, we say P.M. When does, George go to sleep?" (George goes to sleep at 9 P.M.) Under the other clock write, George goes to sleep at 9 P.M. Set both demonstration clocks for seven o'clock and say, "At what time does Cynthia eat breakfast? (Cynthia eats breakfast at 7:00 A.M.) At what time does Cynthia eat dinner?" (She eats dinner at 7:00 P.M.) Ask the students to say the time for each activity and to record it under the appropriate clock using A.M. or P.M.

Repeat this procedure until the chart is completed with activities suggested by the students.

e.g.,

A.M.	P.M.
I am sleeping at 1:00 A.M.	I eat lunch at 1:00 P.M.
I eat breakfast at 7:00 A.M.	I eat dinner at 7:00 P.M.
I arrive at school at 9:00 A.M.	I go to sleep at 9.00 P.M.

3.10.02.06 **solve story problems related to skills learned in this module**

STRATEGY 1: Prepare and display two demonstration clocks with movable hands. One clock should read nine o'clock. The other clock should read ten fifteen. Ask a student to write the correct morning time under each clock, e.g., 9:00 A.M. and 10:15 A.M. Say, "Class 3-2 went to the Planetarium." (Point to the first clock.) Say, "This clock shows the time they left the school. (Point to the second clock.) This clock shows the time they arrived at the Planetarium. How can we determine how long the trip took?" (Several responses are acceptable, e.g., I can move the hands on my clock from 9:00 to 10:15 and count by fives to decide the number of hours and minutes. I can

STRATEGY 1: cont'd

subtract 9:00 from 10:15. I can count forward from 9:00 to 10:15.) Ask a student to write the solution on the chalkboard, e.g., The trip to the Planetarium took 1 hour and 15 minutes. The time from 9:00 a.m. to 10:15 a.m. is 1 hour and 15 minutes.

Repeat this procedure with other problems related to telling time. Ask the students to write and say their answers in complete sentences.

STRATEGY 2: Prepare and display a chart listing T.V. shows from 8:00 A.M. until 8:00 P.M. for only 2 channels.

e.g.,

MORNING	
8:00	(2) Barnaby Jones
	(4) News
8:30	(2) Family Affair
	(4) Muppets
9:00	(2) Popeye
	(4) Sesame Street
9:30	(2) Mr. Rogers
10:00	(4) News
	(2) Movie
10:30	(4) Movie

Ask the students to use the chart to answer questions. e.g.,

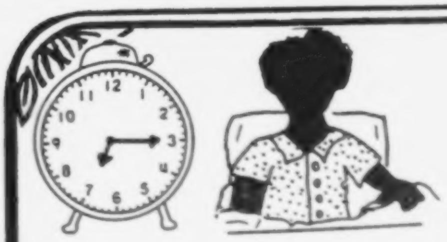
- If each show is one half hour long, how many shows can you see in one hour?...two hours? (You can see 2 shows in one hour and 4 shows in 2 hours.)
- How much time is there between the beginning of Barnaby Jones on channel 2 and the end of Popeye on channel 2? (There is an hour and a half.)

Ask the students to explain the strategies they used to solve the problems.

P.O. 3.10.02.02

NAME: ________________ CLASS: ________ DATE: ________

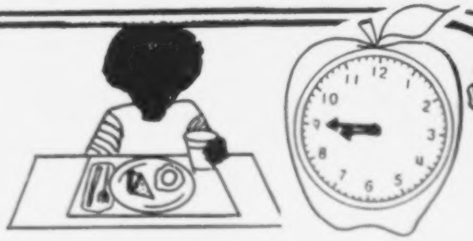
Complete each sentence with the time shown on the clock.



Joey gets up at

a quarter after 7

or 7:15.

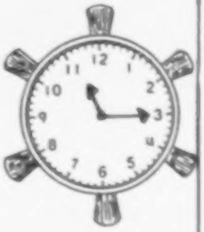


Joey eats breakfast at

a quarter to 9

or 8:45.

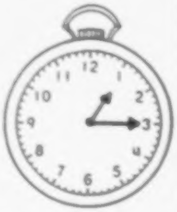
Joey copies his homework at



____

or ________.

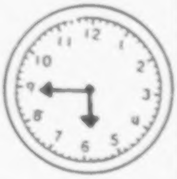
Joey reads his book at



____

or ________.

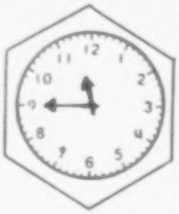
Joey begins his homework at



____

or ________.

Joey eats lunch at

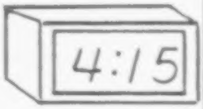


____

or ________.

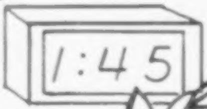
Joey has milk and cookies at

________________.



Joey writes a story at

________________.

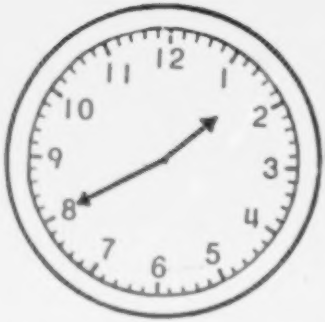


P.O. 3.10.02.03

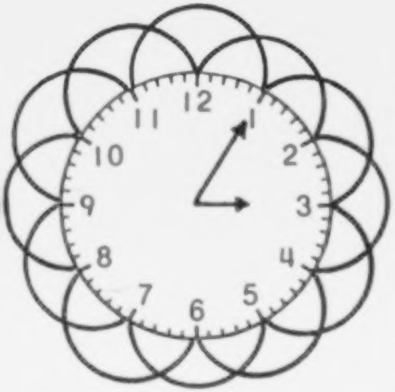
NAME: ______________________ **CLASS:** __________ **DATE:** __________

Follow the directions below.

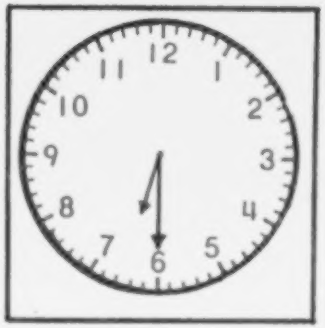
Read each clock. Write its time on the line below it.



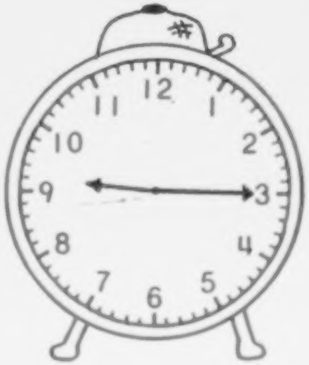
___:___



___:___

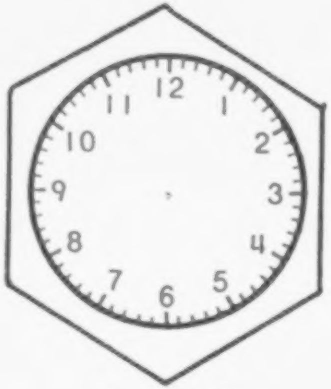


___:___

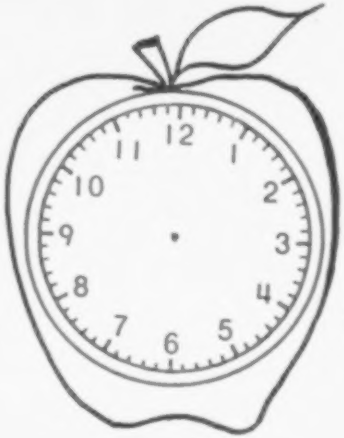


___:___

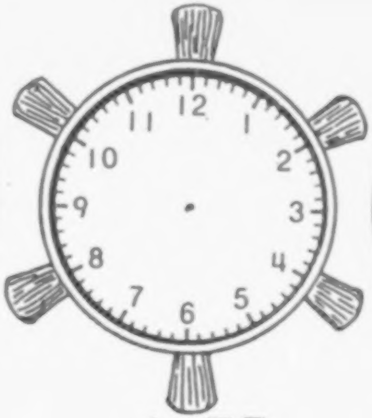
Place hands on each clock to show the correct time.



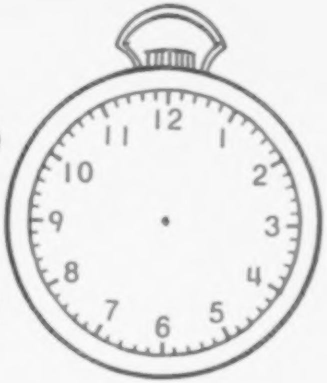
5:50



3:20



1:35

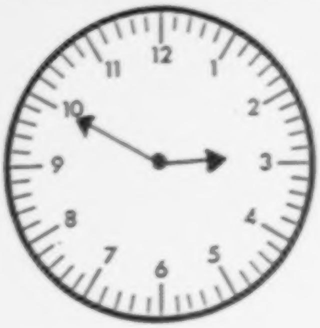


10:15

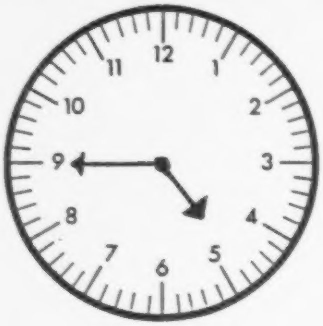
P.O. 3.10.02.04

NAME: ______________________________ CLASS: __________ DATE: ________

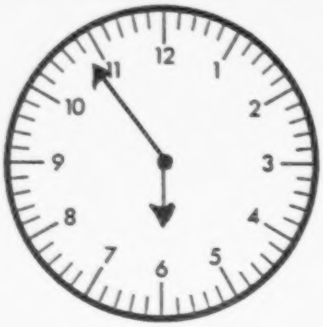
Tell the time by filling in the blanks under each clock.



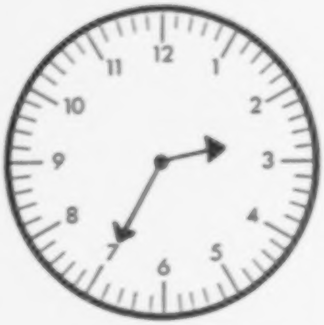
___ minutes to ___



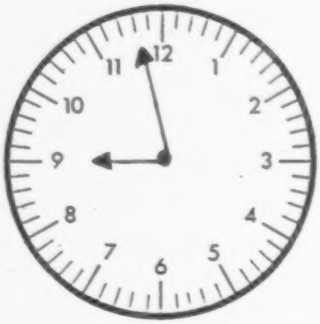
___ minutes to ___



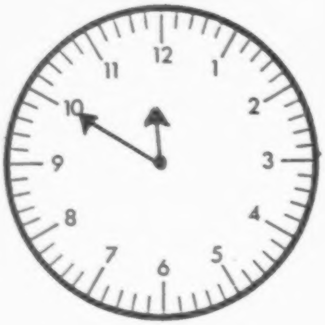
___ minutes to ___



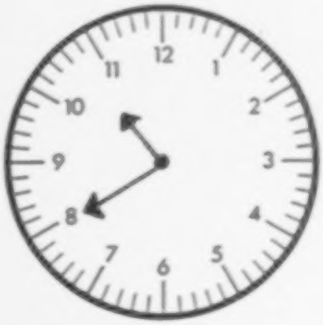
___ minutes before ___



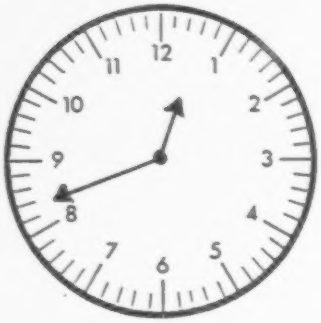
___ minutes before ___



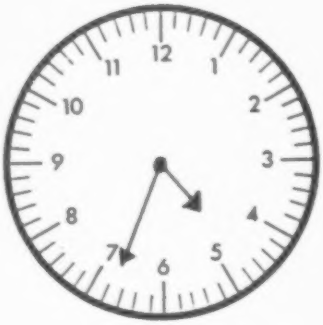
___ minutes before ___



___ minutes of ___



___ minutes of ___



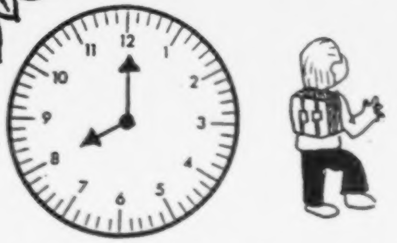
___ minutes of ___

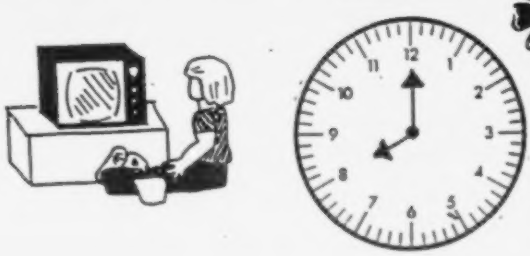
P.O. 3.10.02.05

NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

John watches the A-team at 8:00 P.M.





John walks to school at 8:00 A.M.

Write A.M. or P.M.

1. Sam eats breakfast at 7:30 A.M.
2. Joann went to the library at 11:15 ________.
3. Billy does his homework at 3:30 ________.
4. Joan goes to bed at 9:45 ________.
5. I go to school from 8:30 ______ to 3:00 ______.

Complete the sentences below by using the times listed in the box.

7:30 A.M.	8:00 P.M.	12:30 P.M.	6:00 P.M.	4:00 P.M.

1. Ann eats lunch in the afternoon at 12:30 P.M.
2. Connie brushes her teeth in the morning at ____________.
3. Ronald went to the dentist in the afternoon at ____________.
4. Jon eats dinner in the evening at ____________.
5. Jon listens to the radio after dinner at ____________.

Do you remember?

☐ + 7 = 15

8 + ☐ = 15

15 − ☐ = 7

☐ − 8 = 7

11 − ☐ = 7

☐ − 4 = 7

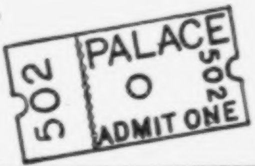
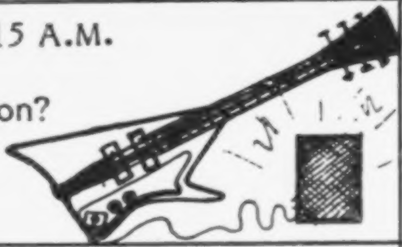
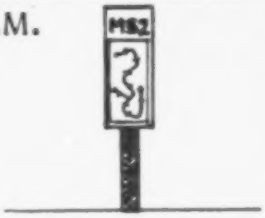
4 + ☐ = 11

☐ + 4 = 11

P.O. 3.10.02.06

NAME: ______________________ CLASS: ________ DATE: ________

Use a clock to help you solve each problem.

	ANSWERS
1. Jane leaves school at 3:00 P.M. She plays volleyball 1 hour and 30 minutes later. What time will the volleyball game start? 	4:30 P.M.
2. Joe ate lunch at 12:30 P.M. He went to the movies 35 minutes later. What time did he go to the movies? 	
3. Mr. Smith began painting at 1:40 P.M. He finished at 4:40 p.m. How long did he work? 	
4. David has a guitar lesson at 11:15 A.M. His lesson is 45 minutes. What time will he finish his lesson? 	
5. Ruth arrived at the bus stop at 8:20 A.M. The bus arrived 15 minutes later. What time did the bus arrive? 	

Do you remember?

check

$$\begin{array}{r}324\\+32\\\hline\end{array}$$

check

$$\begin{array}{r}564\\+35\\\hline\end{array}$$

check

$$\begin{array}{r}730\\+68\\\hline\end{array}$$

3.14.02 PLACE VALUE AND EXPANDED NOTATION THROUGH 999

(1 lesson/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

3.14.02.01 identify the place value of any digit in a number through 999;

e.g.,

H	T	O
	3	6
4	9	7

3.14.02.02 write a 2- or 3-digit number in expanded notation;

e.g.,

36 = 30 + 6
306 = 300 + 6
45 = 4 tens + 5 ones
315 = 3 hundreds + 1 ten + 5 ones

3.14.02.03 identify and write a 2- or 3-digit number in standard form given its expanded notation.

e.g.,

4 tens + 5 ones = 45
4 hundreds + 9 tens + 7 ones = 497
30 + 7 = 37
400 + 20 + 6 = 426

3.14.02

VOCABULARY

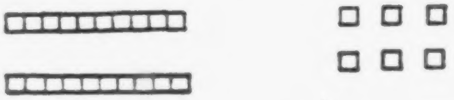
TERMS

ones
tens
place value
standard form
expanded notation

GETTING STARTED 1:

Prepare and distribute squared material (tens and ones) to each student or group of students. Write 26 on the chalkboard. Ask a student to read the number. Say, "How many places does this number have? (This number has 2 places.) What do we call each place? (The place on the right is the ones place. The place on the left is the tens place.) What is the value of the digit in the ones place? (The 6 in the ones place has a value of 6 ones.) What is the value of the digit in the tens place?" (The 2 in the tens place has a value of 2 tens or 20.) Ask the students to represent 26 using their squared material as you demonstrate at the chalkboard.

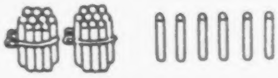
e.g.,

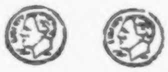


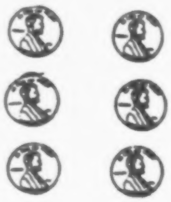
Say, "How many tens are there? (There are 2 tens.) How many ones are there?" (There are 6 ones.) Ask a student to write the expanded form of 26 on the chalkboard, e.g., 26 = 20 + 6.

Say, "Can you find another way to model 26?" (You can model 26 with 2 bundles of sticks (2 tens) and 6 sticks (6 ones) or with 2 dimes and 6 pennies.)

e.g.,







GETTING STARTED 1: cont'd

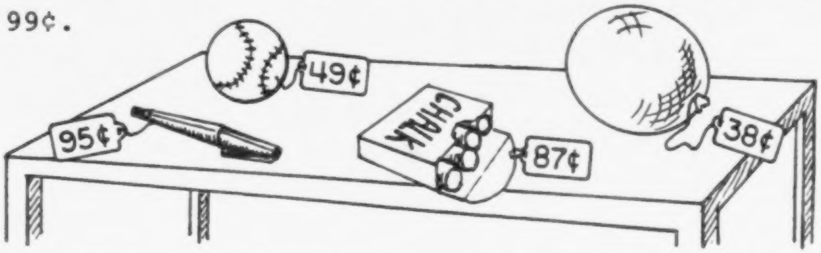
Say, "Does using different materials (squared material, sticks, or coins) change the value of 26?" (No, 26 can be shown as 2 tens and 6 ones with any of these materials.)

Repeat this procedure with other 2-digit numbers through 99.

GETTING STARTED 2:

Prepare and distribute packets of dimes and pennies for each student or group of students. Display various items marked with prices through 99¢.

e.g.,



Say, "You will buy an item on the table and pay for it using only dimes and pennies from your packet. You will name the item you want and show the coins you need to buy it. The other students will also display the coins needed for the purchase." Choose a cashier. Say, "I will buy the softball. How many dimes and how many pennies do I need?" (4 dimes and 9 pennies are needed.) Give the money to the cashier and write the amount on the chalkboard, e.g., 49¢ = 4 dimes + 9 pennies.

Say, "For which item would you need 8 dimes and 7 pennies?" (You would need 8 dimes and 7 pennies for the chalk.) On the chalkboard write 87¢ = 8 dimes and 7 pennies. Say, "For which item would you need 9 pennies? (You would need 9 pennies for the ball.) For which item would you need the fewest dimes? (The balloon; 3 dimes are needed.) If you asked your younger brother or sister to choose a dime or 4 pennies, which coins do you think he/she would choose? (The pennies because there are more of them.) How would you convince him/her that the dime has greater value?" (You could say, "How many penny sticks of gum could you buy with the dime? ... the four pennies?")

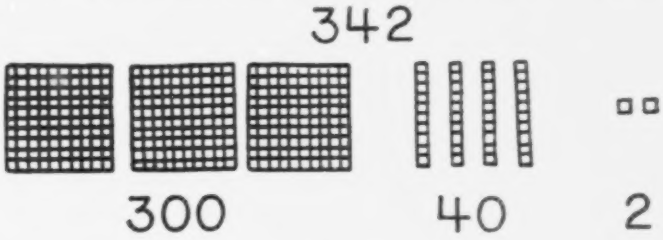
3.14.02

3.14.02.01 **identify the place value of any digit in a number through 999**

STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Say, "We have used squared material to show ones and tens. Show me a tens strip. Show me a ones square. What kind of squared material demonstrates hundreds?" (A card with one hundred squares on it shows a hundred.)

Write 342 on the chalkboard. Ask a student to read the number. Say, "How many places does this number have? (This number has 3 places.) What do we call each place? (The place on the right is the ones place, the place in the middle is the tens place, and the place on the left is the hundreds place.) What is the value of the digit in the ones place? (The 2 in the ones place has a value of 2 ones or 2.) ... the tens place? (The 4 in the tens place has a value of 4 tens or 40.) ... the hundreds place?" (The 3 in the hundreds place has a value of 3 hundreds or 300.) Ask the students to show 342 with their squared material as you demonstrate at the chalkboard.

e.g.,



Say, "Which digit, the 3, the 4, or the 2, is worth the most? ... the least? Explain." (In the number 342, the 3 is worth more than the 4 because it represents 300 and the 4 represents 40.)

STRATEGY 1: cont'd

Say, "Explain the value of each digit in the number 333." (The three in the ones place equals 3 ones or 3, the three in the tens place equals 3 tens or 30 and the 3 in the hundreds place equals 3 hundreds or 300.)

STRATEGY 2:

Display a place value chart on the chalkboard.
e.g.,

Hundreds	Tens	Ones

Prepare a container of red, yellow, and blue markers. Say, "We will use the markers to model numbers as we did in earlier lessons." Ask a student to work at the chalkboard . Say, "Each blue marker represents a one, each yellow marker represents a ten, and each red marker represents a hundred. I will ask a student to reach into this bag of red, yellow, and blue markers. The student will place the markers in the correct column on the place value chart and write the number represented by the markers."
e.g.,

Hundreds	Tens	Ones
●● 2	●● ●● 4	● ●● 3

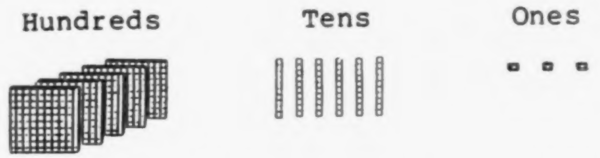
Say, "Let's compare the blue markers with pennies. What is their value? (They both have a value of one.) Let's compare the yellow markers with dimes. What is their value? (Each yellow marker has a value of 10 pennies.) What coin or bill is equal to a red marker?" (A red marker equals a dollar or one hundred pennies.)

3.14.02

3.14.02.02 **write a 2- or 3-digit number in expanded notation**

STRATEGY 1: Prepare and display squared material (hundreds, tens, and ones). Ask a student to write a 3-digit number on the chalkboard, e.g., 563.

Ask another student to represent the number using squared material.
e.g.,



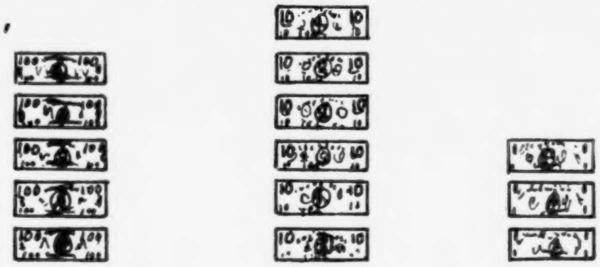
Say, "How can the digits in 563 be written so we know exactly what each digit means without using the squared material?" (We must expand a 3-digit number just as we did a 2-digit number.) Write 563 in expanded notation on the chalkboard.
e.g.,

563 = 5 hundreds + 6 tens + 3 ones
563 = 500 + 60 + 3

Say, "How many hundreds are there? (There are 5 hundreds in the hundreds place.) What is the value of 5 hundreds?" (5 hundreds = 500.) Repeat this for the tens and the ones. Say, "This is called expanded notation." Ask the students to copy the number and its expanded form into their notebooks. Say, "How do we know that in the number 563, 6 has less value than 5? (The 6 in this number represents 6 tens or 60 while the 5 represents 5 hundreds or 500.) How can we find a way to explain expanded notation using money? (We could show 5 one-hundred dollar bills, 6

STRATEGY 1: ten dollar bills, and 3 one dollar bills.)
cont'd

e.g.,



500 + 60 + 3

What happens when a 3-digit number is written in expanded notation?" (A 3-digit number written in expanded notation is separated into its 3 parts; hundreds, tens, and ones. Each digit is given its full value. Therefore, 279 = 200 + 70 + 9.)

STRATEGY 2: Draw four vertical lines on the chalkboard. Say, "You have seen and used a place value chart on which red, yellow, and blue markers were placed. Now let's prepare a place value chart together." Ask a student to tape prepared cards naming hundreds, tens, and ones in the proper column on the chart.

e.g.,

Hundreds	Tens	Ones

Prepare numeral cards (1 through 9) and place them in a container. Ask a student to take 3 numeral cards from the container. Say, "Place the cards on the place value chart so that you create the largest possible number."

e.g.,

Hundreds	Tens	Ones
9	4	2

STRATEGY 2: cont'd

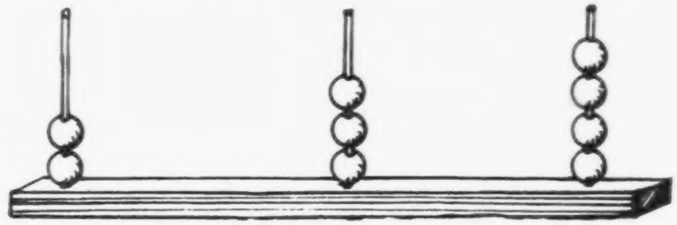
Display a rubber band. Show the rubber band without expanding (stretching) it. Expand it and say, "What did I do to the rubber band? (You stretched it.) Did the rubber band become a different rubber band when I stretched it? (No, it's still the same rubber band.) This number, 942, is like the rubber band before it was expanded. Can a number be expanded and still have the same value? When the rubber band was expanded, it was stretched out. When we expand a number we stretch out the way we write it, but the value of the number does not change." Write 9 hundred + 4 tens + 2 ones on the chalkboard. Say, "Is there another way to write this? (9 hundred + 4 tens + 2 ones can be written as 900 + 40 + 2.) Ask a student to write 942 = 900 + 40 + 2 on the chalkboard.

Repeat this procedure with other 2-and 3-digit numbers. Include numbers with zero in the ones and in the ten places, e.g., 305, 260. Lead the students to conclude that 305 = 300 + 5 and 260 = 200 + 60. Ask the students to write the expanded forms on the chalkboard while other students write them in their notebooks.

3.14.02.03 **identify and write a 2- or 3-digit number in standard form given its expanded notation**

STRATEGY 1: Prepare and display an abacus to represent the number 234.

e.g.,



STRATEGY 1: cont'd

Say, "What is shown on the abacus?" (There are 2 hundreds, 3 tens, and 4 ones on the rods of the abacus.) Ask a student to write that on the chalkboard.

e.g.,

2 hundreds + 3 tens + 4 ones
200 + 30 + 4

Say, "What number is represented by 200 + 30 + 4? (The number is 234.) What is the value of 2 hundreds? (The two hundreds have a value of 200.) ...3 tens? (...30.) ...4 ones?" (...4.)

Ask the students to write both the expanded and the standard forms of 234 into their notebooks. Say, "How can we represent 300 + 40 + 2 on the abacus? (We can represent 300 + 40 + 2 by placing 3 beads on the hundreds rod, 4 beads on the tens rod, and 2 beads on the ones rod.) What is the standard form of 300 + 40 + 2?" (The standard form is 342.)

STRATEGY 2: Prepare and display strips of adding machine tape on which are written the expanded form of a number in words.

e.g.,

2 hundreds + 4 tens + 9 ones

200 + 40 + 9

Display a large rubber band. Ask a student to expand or stretch it. Say, "This stretched rubber band can return to its original size which looks smaller but is still the same rubber band. Can 200 + 40 + 9 return to a smaller size and be written with fewer numbers? Will the value change?" (200 + 40 + 9 can be written as 249. The value will not change.)

STRATEGY 2: cont'd

Say "What would happen if we rearranged the order in which these numbers are added?" (The sum, 249, would be the same.)

e.g.,

200 40 + 9	9 40 + 200	9 200 + 40	40 9 + 200

Say, "What do you think would happen, if we rearranged the place of the digits? e.g., 294, 249, 429, 492, 942, 924 (The standard number would be different because the digits are in different places and their values have changed.) What is the value of 2 in 294? (200) ... in 429? (20) ... in 942?" (2)

P.O. 3.14.02.01

NAME: ______________________ CLASS: ________ DATE: ________

Look at the underlined digit in each number.
Circle the word and numeral which tells its value.

581	Hundreds	[✓ Tens]	Ones	800	[✓ 80]	8
335	Hundreds	Tens	Ones	300	30	3
704	Hundreds	Tens	Ones	700	70	0
653	Hundreds	Tens	Ones	500	50	5
712	Hundreds	Tens	Ones	700	70	7
809	Hundreds	Tens	Ones	900	90	9
924	Hundreds	Tens	Ones	400	40	4
723	Hundreds	Tens	Ones	200	20	2
222	Hundreds	Tens	Ones	200	20	2
313	Hundreds	Tens	Ones	300	30	3

Do you remember?

2, 3, 6	
3x2=6	6÷2=3
2x3=6	6÷3=2

3, 4, 12	

5, 4, 20	

P.O. 3.14.02.02 - .03

NAME: ______________________ CLASS: __________ DATE: ________

Follow the directions below.

Write each number in expanded form.

245 = 2 hundreds + 4 tens + 5 ones

518 = ☐ hundreds + ☐ tens + ☐ ones

602 = ☐ hundreds + ☐ tens + ☐ ones

274 = 200 + 70 + 4

187 = ____ + ____ + ____

310 = ____ + ____ + ____

Write each number in standard form.

400 + 60 + 3 = ______

700 + 20 + 8 = ______

500 + 6 = ______

2 hundreds + 1 ten + 4 ones = ______

4 hundreds + 2 tens + 6 ones = ______

7 hundreds + 8 tens + 7 ones = ______

Do you remember? Count by tens.

660, 670, 680, ____, ____, ____, 720

70, ____, ____, ____, ____, ____, 130

480, ____, ____, ____, ____, ____, 540

250, ____, ____, ____, ____, ____, 310

3.01.01 COUNT BY TENS AND HUNDREDS THROUGH 1000

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.01.01.01A count and write by ones forward and backward bridging the hundreds (99 through 1000);
e.g.,

299, 300, 301, ...
501, 500, 499, ...

*3.01.01.02A count and write by tens forward and backward within the hundreds;
e.g.,

200, 210, 220, ..., 300
600, 590, 580, ..., 500

*3.01.01.03A count and write by hundreds forward and backward to and from 1000.
e.g.,

100, 200, 300, ..., 1000
1000, 900, 800, ..., 100

VOCABULARY

TERMS

forward
backward

GETTING STARTED 1:

Prepare and display a number line with multiples of ten, e.g., 10, 20, 30, ...100. Divide the class into two teams and say, "Today we will see how well we remember counting forward and backward by tens through 100. I will read several problems. All the problems require adding 10 or taking away 10 from a given numeral. You may use the number line. Each team member will write his/her answer on the chalkboard. If you are correct, you score a point for your team. Let's do one together. ' Mrs. Chips baked 30 cookies. She gave 10 to her sister. How many cookies does she have left?' (She has 20 cookies left.) How did you get your answer?" I used the number line and I subtracted 10 from 30.) Continue the game until one team has 20 points.

GETTING STARTED 2:

Ask the students to sit in a circle. Say, "We will play, What Comes Next? I will say a number from 1 through 99. Raise your hand if you think you know what number comes next. If you are correct, you may call out a new number and another student will say the number that comes next."

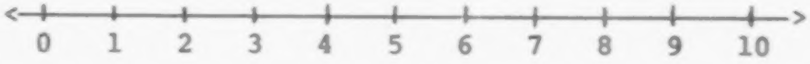
Continue the game until each student has had a chance to participate. Say "Do numbers get larger or smaller when counting forward? (Numbers get larger when counting forward.)...when counting backward?" (...smaller when counting backward.)

3.01.01

3.01.01.01 count and write by ones forward and backward bridging the hundreds (99 through 1000)

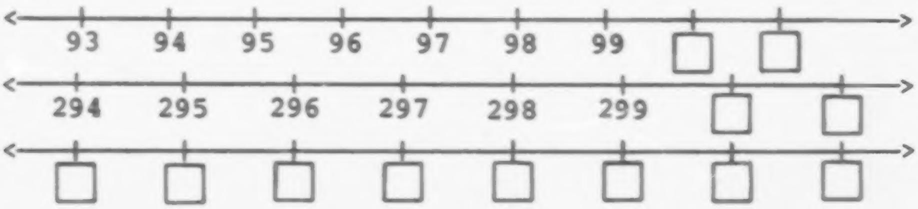
STRATEGY 1: Make available several dictionaries, each with 2000 pages for each group of students. Draw a number line on the chalkboard.

e.g.,



Say, "A number line shows how numbers are ordered. The pages of a book are numbered in order. Turn to page 99 in your book. What page comes after 99? (Page 100 comes after 99.) What page comes after 100? (Page 101 comes after 100.) What page comes before 101? (Page 100 comes before 101.) What page comes before 100?" (Page 99 comes before page 100.) Draw several other number lines on the chalkboard which bridge the hundreds.

e.g.,



Say, "Locate the pages that come before, after, or between other pages to complete the remaining number lines on the chalkboard. Copy the number lines into your notebooks."

Say, "What numbers always follow the 99's? (The hundreds always follow the 99's. 100 follows 99, 200 follows 199, 300 follows 299...) When the hundreds follow the 99's are we counting forward or backward?" (When the hundreds follow the 99's, we are counting forward.) Repeat this procedure for counting backward

STRATEGY 1: cont'd

from the hundreds. Write the following chart on the chalkboard.

Counting Forward	Counting Backward
98, 99, 100, 101	801, 800, 799, 798
198, 199, 200, 201	701, 700, 699, 698

STRATEGY 2:

Prepare and distribute a hundreds chart to each student. Display a large hundreds chart.

e.g.,

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39

Say, "Look at the first and second columns of numbers on the left side of this chart. How are the numbers in the first column alike?...in the second column? (They are alike because they have the same digit in the ones place.) How are the numbers in the first column different?...in the second column?" (They are different because each number increases by ten as you move down the chart.) Discuss similar patterns in the other columns. Point to the first two rows and say, "How are the first two rows alike? (These rows are alike because the digits in the ones place increase by one as you move from left to right.) The tens digit remains the same as you look across the row.) How are these rows different?" (These rows are different because in the first row there are only 1-digit numbers, in the other rows there are 2-digit numbers. The digit in the tens place is the same across each row but increases by 1 in each row from top to bottom.)

Say, "You will make a hundreds chart for the numbers 101 through 200. What numbers should we write in the first row? (The first row should have 101, 102, 103, 104, 105, 106, 107, 108, 109 and 110.) What numbers

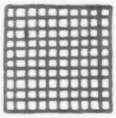
STRATEGY 2: cont'd

should we have in the first column?" (The first column should read 101, 111, 121, 131, 141, 151, 161, 171, 181, and 191.) Ask the students to complete the rest of the chart to 200. When the charts are completed, discuss the similarities and differences of the patterns with the first chart. Extend this concept by making charts for different decades through 1000.

3.01.01.02 **count and write by tens forward and backward within the hundreds**

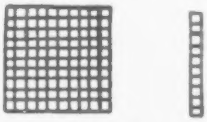
STRATEGY 1: Prepare squared material (hundreds and tens). Display a one hundred square and elicit its value from the students. (This square is worth 100 units.)

e.g.,



100

Ask a student to write its value on the chalkboard. Say, "If we add 1 ten strip, how much do we now have?" (We now have 110.) Ask another student to write on the chalkboard, = 110.
e.g.,



100 + 10 = 110

Continue to add tens strips through 200. Once the pattern has been completed, e.g., 100, 110, 120,...200, say "How would you describe this pattern?

STRATEGY 1: cont'd

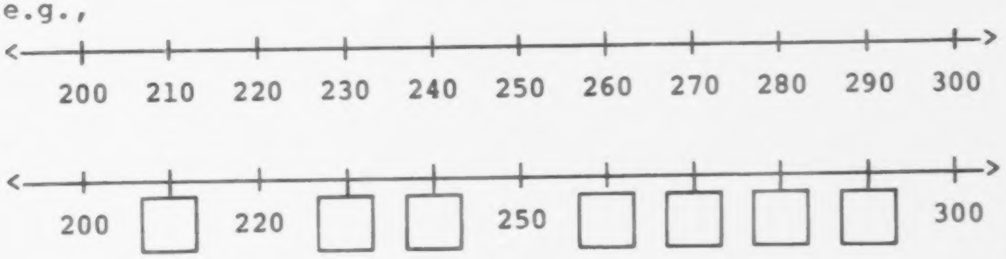
(We are counting by tens.) How do you know?" (We have ten more each time we count.) Ask the students to read the pattern forward and backward and to write it in their notebooks. Say, "How would you know what the next number will be?" (The pattern continues from 210 through 300.)

Repeat this procedure for counting by tens forward and backward within other hundreds.

STRATEGY 2:

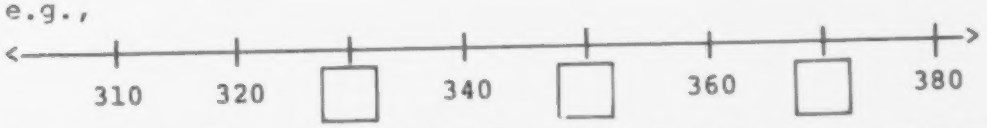
Draw two number lines on the chalkboard. Number the first line from 200 through 300 by tens. The second number line should contain many blank spaces.

e.g.,



Say, "We have counted forward and backward by tens through 100 on a number line. What does this first number line show us? (The first number line shows us how to count by tens from 200 to 300.) Who can tell us what number comes after 200 when we count by tens? (210 comes after 200 when we count by tens.) Write 210 in the correct space on the second number line." Continue this procedure to complete this number line. Draw a third number line on the chalkboard.

e.g.,



Say, "What number comes before 380 when we count by tens? (370 comes before 380 when we count by tens.) Write 370 in the correct space." Continue this procedure of counting backward to complete this number line.

STRATEGY 2: cont'd Repeat this procedure for counting by tens forward and backward within other hundreds.

3.01.01.03 **count and write by hundreds forward and backward to and from 1000**

STRATEGY 1: Ask the students to fold a looseleaf paper into 4 columns and label the columns A, B, C, and D. Say, "We have counted forward and backward by tens through 1000. Now we will count by hundreds through 1000. I will start to count by hundreds. You will continue the count by hundreds to 1000 on your paper in column A, e.g., 100, 200,...1000." Record the information on the chalkboard. e.g.,

Counting Forward by Hundreds

A	B	C	D
300	500	200	800
400	600	300	900
500	700	400	1000
600	800	500	
700	900	600	
800	1000	700	
900		800	
1000		900	
		1000	

Ask the students to turn their papers to the other side and label these columns E, F, G, and H. Continue this procedure by counting backward by hundreds from 1000. Pair the students and ask one student to begin the count and the other student to continue counting and writing on the folded paper. Record the information on the chalkboard.

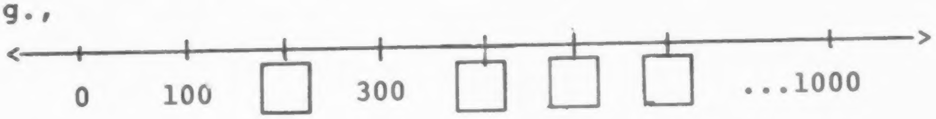
STRATEGY 1:
cont'd e.g.,

Counting Backward by Hundreds

E	F	G	H
800	500	900	300
700	400	800	200
600	300	700	100
500	200	600	
400	100	500	
300	400		
200	300		
100	200		

STRATEGY 2: Draw a number line on the chalkboard numbered by hundreds from 100 through 1000, omitting several of the numbers.

e.g.,



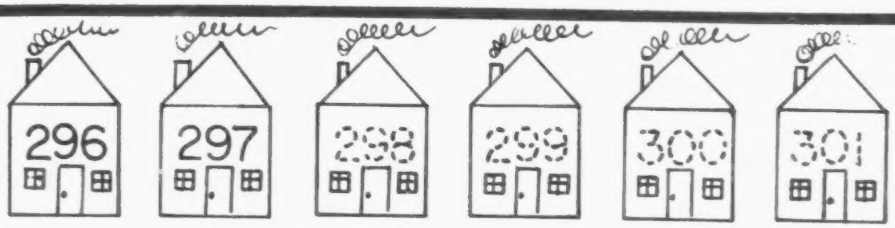
Say, "We have used a number line to count forward and backward by tens through 1000. What method of counting is used on this number line? (We are counting by hundreds.) Which number follows 100 when counting by hundreds?" (200 follows 100 when counting by hundreds.) Ask a student to fill in the appropriate square on the number line. Continue until the number line is completed.

Repeat this procedure for counting backward by hundreds from 1000.

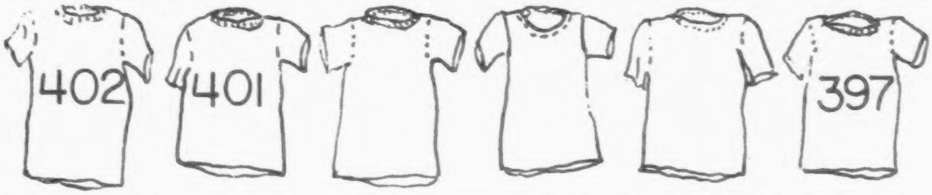
P.O. 3.01.01.01

NAME: ______________________ CLASS: __________ DATE: ________

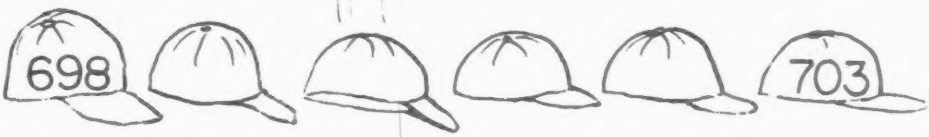
Complete each number sequence. If the numbers are getting larger, write forward. If the numbers are getting smaller, write backward.


296
297
298
299
300
301

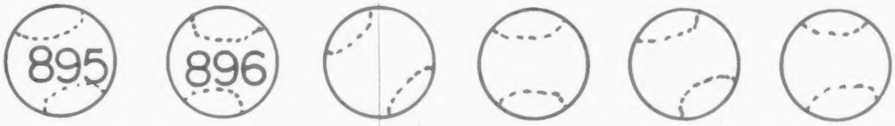
forward



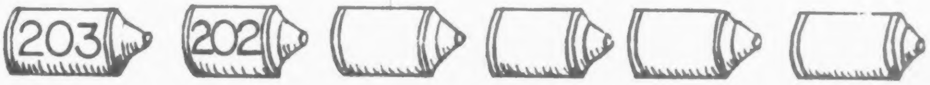
____



____



____



____

Do you remember?

Today is 11/16/86.

The month is ______________.

The year is __________.

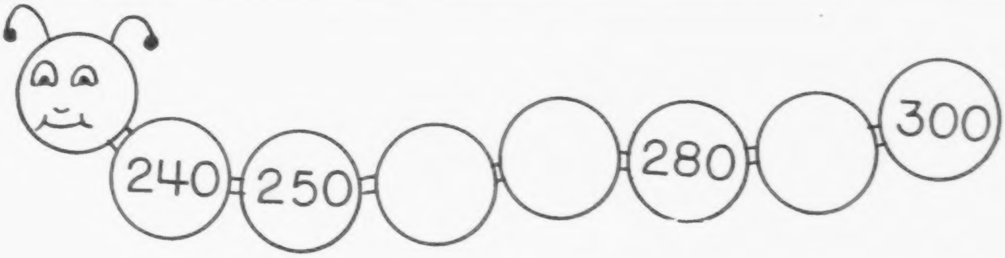
Tomorrow's date is ______________.

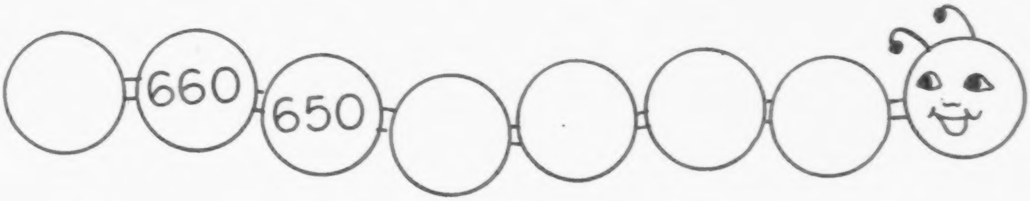
Yesterday's date was ______________.

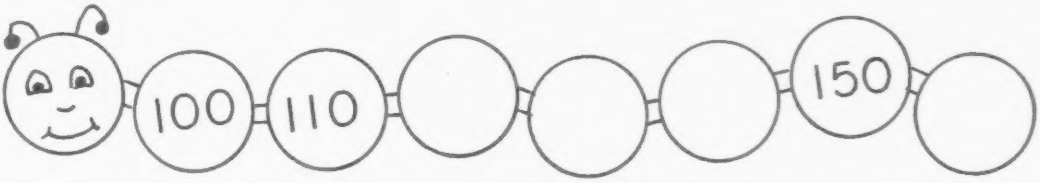
P.O. 3.01.01.02-.03

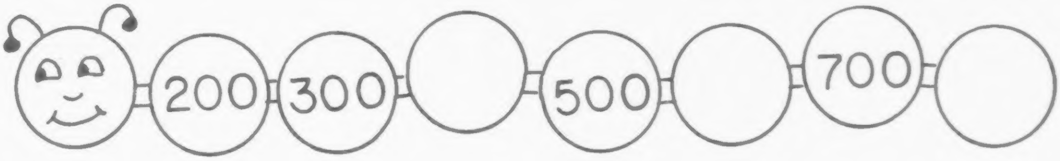
NAME: ______________________ CLASS: __________ DATE: ________

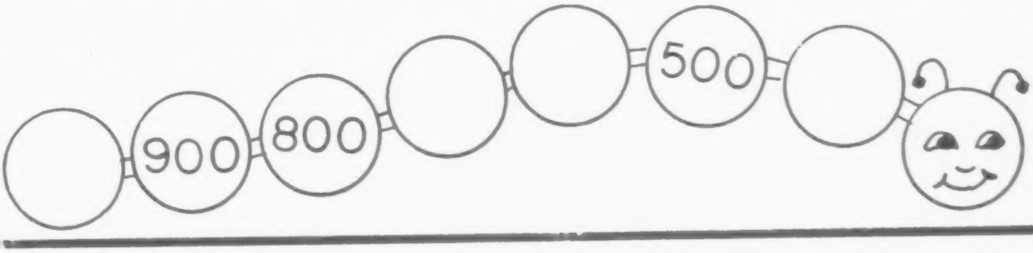
Complete each caterpillar by writing the missing numbers as you count forward or backward.


240
250
280
300






200
300
500
700



CHALLENGE!

68, ______, 88, ______, 108, ______

______, 174, 164, ______, 144, ______

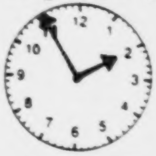
SHARPENING YOUR SKILLS

Units 4, 5, 6

Name: ______________ **Class:** __________ **Date:** ________

Which digital clock shows the same time as the standard clock?

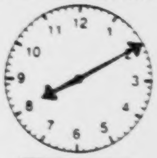
1.



ⓐ 1:11 ⓒ 1:55

ⓑ 11:02 ⓓ 2:55

2.



ⓔ 8:10 ⓖ 2:10

ⓕ 2:08 ⓗ 8:02

3. Willie went to sleep at 10:00 P.M. He woke up three hours later. At what time did he wake up? ____________

4. 3 hundreds + 7 ones = ☐

ⓐ 3007 ⓒ 7300

ⓑ 307 ⓓ 7003

5. 700 + 30 + 8 = ☐

ⓔ 837 ⓖ 738

ⓕ 700308 ⓗ 7308

	H	T	O		
6.		2	4	=	☐
7.	6	4	5	=	☐

Find the patterns. Fill in the missing numbers.

8. 697, 698, 699, ____, 701, ____, ____, 704

9. 102, 101, ____, ____, 98, 97, ____, ____

10. 300, 400, ____, 600, ____, 800, ____, ____

11. 780, 770, ____, 750, 740, ____, ____

12. 70, 80, ____, 100, ____, ____, 130, ____

97

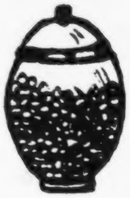
3.01.02 ROUND 3-DIGIT NUMBERS TO THE NEAREST TEN/HUNDRED

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.01.02.01B estimate large numbers;
e.g.,



How many beans do you think are in this jar?

*3.01.02.02A round a 3-digit number, having its tens digit less than 5, to the nearest hundred;
e.g.,

249 to the nearest hundred is 200
136 to the nearest hundred is 100

3.01.02.03A round a 3-digit number, having its tens digit more than 5, to the nearest hundred;
e.g.,

163 to the nearest hundred is 200
487 to the nearest hundred is 500
578 to the nearest hundred is 600

3.01.02.04A round a 3-digit number, having 5 for its tens digit, to the nearest hundred;
e.g.,

251 to the nearest hundred is 300
350 to the nearest hundred is 400

3.01.02.05A round a 3-digit number to the nearest ten.

e.g.,

351 to the nearest ten is 350
468 to the nearest ten is 470

VOCABULARY

TERMS

estimate
nearest ten
nearest hundred
round
rounding up
rounding down
guess

GETTING STARTED 1:

Prepare and display a jar of jelly beans and a chart.

e.g.,

Group	1st Estimate	2nd Estimate	Actual Count
1			
2			
3			

Divide the students into groups of four or five. Say, "There are less than 100 jelly beans in the jar. Look at the jar carefully. Each group will guess how many jelly beans are in the jar." Ask one member of each group to write the group's estimate on the chart in the 1st Estimate column. Ask a student to start counting the jelly beans by tens. After one minute ask the student to stop counting, consult with his/her group, and write the group's estimate on the chart in the 2nd Estimate column. Ask another student to continue counting until the actual amount is found. Record the actual count on the chart. Compare the 1st and 2nd estimates to the actual amount. Say, "Why was your first estimate a two digit number? (We were given a hint that there were less than 100 jelly beans in the jar.) Explain how you arrived at the second estimate? (When the jar was full, I made an estimate. After one minute of counting by tens, I saw that my estimate was too high/low and I made a second estimate.) If I filled the same jar with jelly beans again, would you be able to make a better estimate? Explain." (Yes, because I could compare it to the estimates made in this activity.)

GETTING STARTED 2:

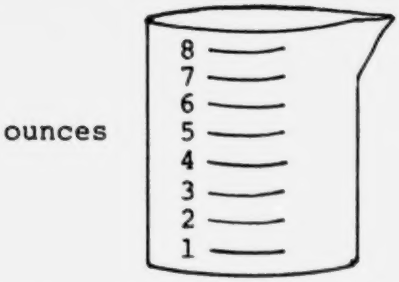
Prepare and display a set of flash cards containing multiples of 10 (10,20,30,...100) on the ledge of the chalkboard, and a box of flash cards with numbers that are not multiples of 10, e.g., 42, 67, 54. Ask a student to select one card from the box and read the number written on it, e.g., 42. Say, "Look at the numbers displayed. Between which pair of tens does 42 belong? (42 belongs between 40 and 50.) To which ten is 42 closer? (42 is closer to 40 than to 50.) We can say that 42 rounds to 40." Ask the student to place the card next to the 40. Say, "Can you explain why you are correct?" (You can find the difference between 42 and 40 and then find the difference between 42 and 50. 2 is less than 8. Therefore, 42 rounds to 40.) Repeat this procedure using other flash cards until sufficient practice has been given. Ask the students to recall the rule for rounding to the nearest ten when the digit in the ones place is 5.

3.01.02

3.01.02.01 **estimate large numbers**

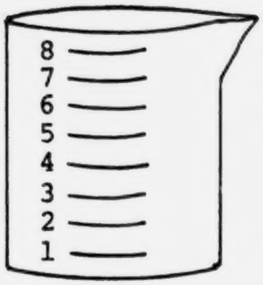
STRATEGY 1: Prepare and display several droppers, 8 oz. cups which are calibrated by ounces, and several basins of water. Draw a picture of the 8 oz. container on the chalkboard.

e.g.,



Say, "This activity is similar to the jelly bean activity. We will find out how many drops of water it takes to fill the cup." Display a chart next to the picture of the container drawn on the chalkboard.

e.g.,



Group	1st Estimate	2nd Estimate
1		
2		
3		

Divide the students into groups of four or five. Ask the students to estimate how many drops of water it will take to fill the cup and to record their estimates on the chalkboard in the 1st Estimate column. Ask the students to explain the strategy they used to determine their first estimate. Ask one student in each group to use the dropper to fill the cup as the other students keep count. After the cups have been filled to 1 ounce say, "Is there a faster

STRATEGY 1: cont'd

way of determining the number of drops that will fill the cup?" (Yes, if we know the number of drops in one ounce, we can add that number eight times to estimate the number of drops which will fill the cup.) Ask each group to estimate again and to record the second estimates in the 2nd Estimate column. Say, "Why is it easier to make an estimate now?" (Now we know the number of drops it takes to fill one ounce. We can make a better estimate as to how many drops it will take to fill eight ounces.)

STRATEGY 2:

Prepare and display several pieces of grid paper with large squares and several boxes of counting materials, e.g., beans, macaroni, beads, cubes. Say, "You will estimate the number of pieces you have in your box without counting each and every piece." Display a chart on the chalkboard and divide the students into groups.

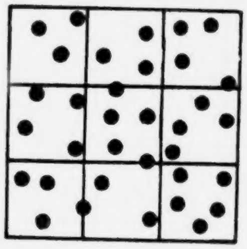
Ask the students to estimate the number of pieces in the box and to record their estimates on the chalkboard in the first column of the chart.

e.g.,

Group	1st Estimate	2nd Estimate
1		
2		
3		

Ask the students to pour the contents of their box onto the grid.

e.g.,



103

3.01.02

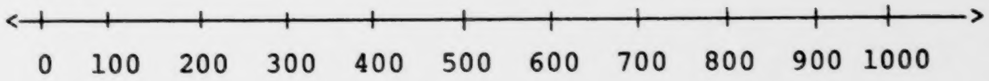
STRATEGY 2: cont'd

Say, "How do you think the grid paper can help us make a better estimate?" (We can count the number of pieces covering one square on the grid and add it 9 times because there are 9 squares on the grid.) Now we can make a better second estimate." Ask the students to estimate again and to record their estimates on the chart. Say, "Why is your second estimate probably better than your first estimate?" (The second estimate is more accurate because we found a way to make a better estimate and not just a guesstimate.)

3.01.02.02 **round a 3-digit number, having its tens digit less than 5, to the nearest hundred**

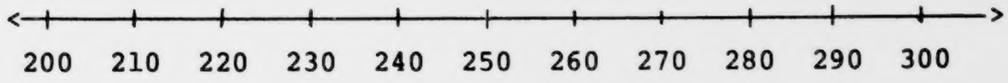
STRATEGY 1: Prepare and display a number line with multiples of 100.

e.g.,



Prepare and display a set of flash cards, each with a 3-digit number whose tens digit is 0, 1, 2, 3 or 4, e.g., 124, 236, 316,... Say, "Each card has a 3-digit number on it. Let's place each card near its closest number on the number line. Are the numbers on the number line hundreds or tens?" (The numbers on the number line are hundreds.) Point to a number card, e.g., 236. Say, "Between which pair of hundreds does 236 come? (236 comes between 200 and 300.) We can tell which hundred it is closer to by looking at the tens place." Draw another number line on the chalkboard counting by tens from 200 to 300.

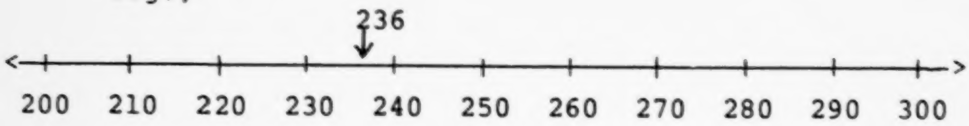
e.g.,



STRATEGY 1: cont'd

Ask a student to indicate on the number line about where 236 will be.

e.g.,



Say, "Is 236 closer to 200 or to 300? (236 is closer to 200.) 250 has a 5 in the tens place. It is the half way point between 200 and 300. Whenever the tens digit is less than 5, we round to the lower hundred. In 236, the tens digit is less than 5. 236 rounds to 200 or 236 rounded to the nearest hundred is 200."

Ask a student to select another card and read the number, e.g., 124. Say, "You have selected 124. Let's pretend that Dave Winfield batted in 124 runs last year. Did he bat closer to 100 or to 200 runs? (He batted closer to 100 runs.) How do you know?" (In the number 124, the tens digit is less than 5, so we round to the lower hundred. Elicit and write on the chalkboard: 124 to the nearest hundred is 100.

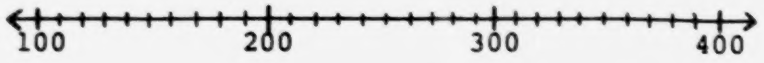
Repeat this procedure using the other cards. Say, "Why do we round numbers? (We round numbers to help us estimate. It is easier to estimate answers to problems with large numbers.) If a 3-digit number has a 0, 1, 2, 3 or 4 in the tens place, is it rounded to the higher hundred or to the lower hundred?" (It is rounded to the lower hundred.) Elicit and write on the chalkboard: If a 3-digit number has a 0, 1, 2, 3, or 4 in the tens place, it is rounded to the lower hundred.

3.01.02

3.01.02.03 **round a 3-digit number, having its tens digit more than 5, to the nearest hundred**

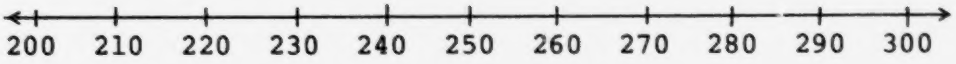
STRATEGY 1: Prepare and display a number line showing multiples of 10 and 100.

e.g.,



Say, "Mr. Video is a salesman. He spends time traveling to different cities selling video cassettes. During the first week of September he drove 267 miles. He recorded the miles to the nearest hundred. Let's look at the number line. Between which two numbers is 267?" (267 is between 200 and 300.) Let's mark the tens between 200 and 300.

e.g.,



Say, "When the tens digit is 6, 7, 8 or 9, we round to the next higher hundred. To which hundred is 267 closer? (267 is closer to 300.) Mr. Video knew that 267 was closer to 300 so he recorded 300."

Say, "How many spaces can you count between 260 and 300? (There are 4 spaces between 260 and 300) ... between 260 and 200?" (... 6 spaces between 260 and 200). Write on the chalkboard: 267 to the nearest hundred is 300. Say, "Therefore 267 is closer to 300 than to 200."

Repeat this procedure using other 3-digit numbers with the tens digit greater than 5.

3.01.02

3.01.02.04 **round a 3-digit number, having 5 for its tens digit, to the nearest hundred**

STRATEGY 1: Use strategies from P.O. 3.01.02.02 and 3.01.02.03. Elicit the rule for rounding numbers to the nearest hundred when there is a 5 in the tens place. Write the rule on the chalkboard.

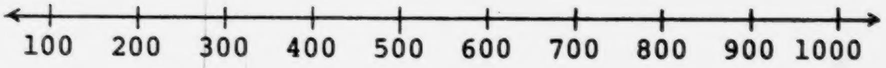
Rule: When rounding a number with a 5 in the tens place to the nearest hundred, round to the higher hundred, e.g., 350 rounds to 400 or 350 to the nearest hundred is 400.

3.01.02.05 **round a 3-digit number to the nearest ten**

STRATEGY 1: Prepare and distribute a set of numeral cards. Each card should have a 3-digit number between 400 and 500. Display a number line from 100 through 1000 in intervals of one hundred.

e.g.,

Main Street



Say, "This number line shows the bus route for the express bus on Main Street. Each number you see is an address on Main Street." Point to 400 and say, "This is 400 Main Street. The bus does not stop at addresses in between the numbers you see, e.g., 410, 420, 430...490. You arrive at the closest stop by looking at the tens place in your number. Where will the bus stop if the digit in the tens place is 1, 2, 3, or 4? (The bus will stop at the lower bus stop number.) Where will the bus stop if the digit in the tens place is 5, 6, 7, 8, or 9? (The bus will stop at the higher bus stop number.) What are the possible addresses of people who get on or off the bus at 40 Main Street?" Their addresses may be 350, 360, 370,

STRATEGY 1: cont'd

380, 390, 410, 420, 430, or 440 Main Street.) Ask each student to say his/her number and the closest bus stop.

Say, "What is the rule when rounding a 3-digit number to the nearest ten?" Elicit the response and write it on the chalkboard, e.g., When rounding a 3-digit number to the nearest ten, look at the digit in the ones place. If it is 1, 2, 3, or 4, round down, if it is 5, 6, 7, 8, or 9, round up. Therefore 234 rounded to the nearest ten is 230. 476 rounded to the nearest ten is 480.

NOTE: Discuss the reasons for rounding to the nearest ten and rounding to the nearest hundred. Encourage the students to discover that sometimes rounding down can create problems, e.g., For an item costing $342, if you round down to $340 you would not have enough money to make the purchase. However, if you round to the nearest ten, e.g., $350, then you would have more than enough money. Hence, it is important to distinguish between when it is appropriate to round up to the nearest ten and when it is appropriate to round down to the nearest ten.

STRATEGY 2:

Divide the students into two teams. Say, "We will play Round Off. What are the rules for rounding numbers to the nearest ten?" (If the digit in the ones place is 1, 2, 3 or 4, round to the lower ten. If the digit in the ones place is 5, 6, 7, 8 or 9, round to the higher ten.) Write these rules on the chalkboard. I will give each team a different 3-digit number. First you will round that number to the nearest ten. Then you will state the rule you used. Each time you answer correctly your team will win a point." Write 372 on the chalkboard and say, "Between which two tens is 372? (372 is between 370 and 380.) Shall we round to 370 or to 380?" (372 rounds down to 370 because the digit in the ones

STRATEGY 2: cont'd

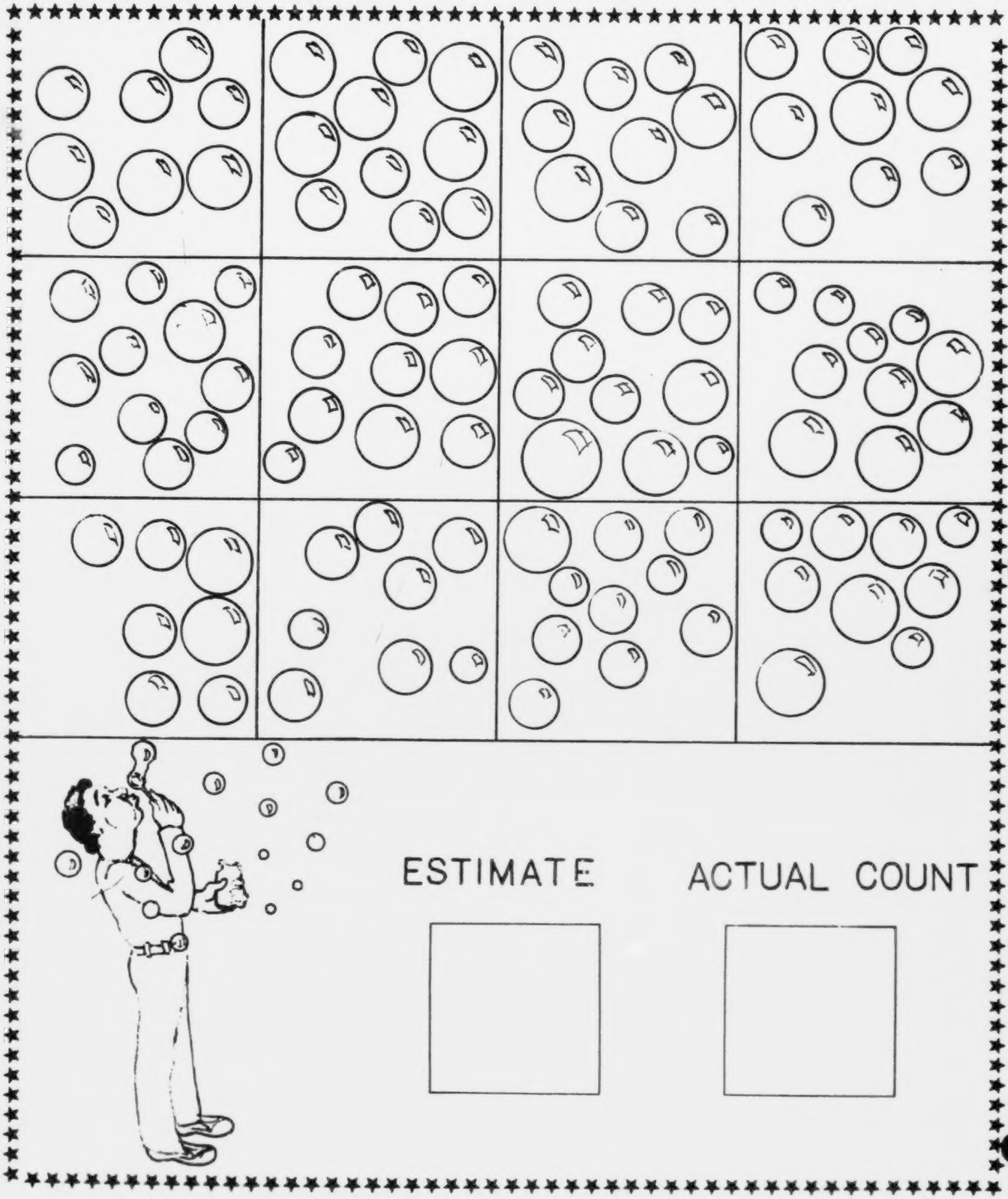
place is less than 4.) Write 426 on the chalkboard and say, "Between which tens does this number appear? (426 appears between 420 and 430.) Shall we round to 420 or to 430?" (426 rounds up to 430 because the digit in the ones place is greater than 5.) Continue playing the game. The first team to get 20 points wins.

Ask the students to state the rules for rounding numbers to the nearest ten.

P.O. 3.01.02.01

NAME: ______________________________ CLASS: __________ DATE: ________

Estimate the number of bubbles. Then count the bubbles for the actual count.


ESTIMATE
ACTUAL COUNT

P.O. 3.01.02.02.-.03

NAME:______________________ CLASS:________ DATE:________

Follow the directions below.

Shade in the ⇧ if you are rounding up and the ⇩ if you are rounding down. Then round the number to the nearest hundred.

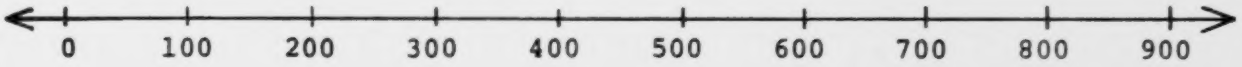
A. ⇧⬇ 136 rounds to the nearest hundred as ______.

B. ⇧⇩ 616 rounds to the nearest hundred as ______.

C. ⇧⇩ 872 rounds to the nearest hundred as ______.

D. ⇧⇩ 243 rounds to the nearest hundred as ______.

Books must be ordered in groups of one hundred. On the number line circle the number of books you must order if there are 682 students in your school.



Will this be enough for all students?__________

Will any books be left over? ________ How many? __________

Round each animal's weight to the nearest hundred pounds.

362 lbs.

__400__ lbs.

395 lbs.

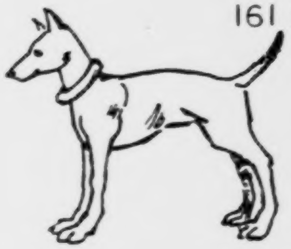
________ lbs.

123 lbs.

________ lbs.

781 lbs.

________ lbs.



161 lbs

________ lbs.

695 lbs.

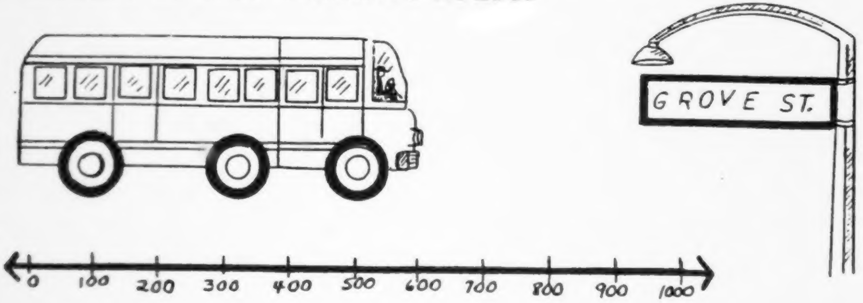
________ lbs.

P.O. 3.01.02.02-.04

NAME:______________________________________ CLASS:__________ DATE:________

Follow the directions below.

The school bus stops on Grove Street at all the house numbers on the number line. Below are some students and their house numbers. Write the stop that is closest to each student's house.


GROVE ST.
0
100
200
300
400
500
600
700
800
900
1000

623 ______

472 ______

350 ______

255 ______

306 ______

924 ______

688 ______

356 ______

137 ______

Do you remember?

WRITE > OR < .

246 < 729	589 ○ 598	64 ○ 106
685 ○ 274	706 ○ 760	580 ○ 508
756 ○ 567	124 ○ 321	516 ○ 472

P.O. 3.01.02.05

NAME: ______________________ CLASS: ________ DATE: ________

Complete the work below.

How do you round a 3-digit number to the nearest ten? Look at the _______ place.

If the digit in the _______ place is 0, 2, 3, or 4 you round to the next lower ten.

723 rounded to the nearest ten is 720.

841 rounded to the nearest ten is ____________.

364 rounded to the nearest ten is ____________.

852 rounded to the nearest ten is ____________.

170 rounded to the nearest ten is ____________.

If the digit in the _______ place is 5, 6, 7, 8, or 9 you round to the next higher ten.

536 rounded to the nearest ten is 540.

248 rounded to the nearest ten is ____________.

165 rounded to the nearest ten is ____________.

307 rounded to the nearest ten is ____________.

319 rounded to the nearest ten is ____________.

You will round each number below to the nearest ten. Write an arrow pointing up (↑) if the number rounds to the next higher ten. Write an arrow pointing down (↓) if the number rounds to the next lower ten.

347 ↑ 350 513 __ ________ 289 __ ________

652 __ ________ 426 __ ________ 133 __ ________

3.01.03 PLACE VALUE THROUGH 9,999

(2-3 lessons)

PERFORMANCE OBJECTIVES

	The student will be able to...
3.01.03.01A	identify and write 4-digit numbers in expanded notation; e.g., 1 thousand + 2 hundreds + 3 tens + 6 ones 1236 = 1000 + 200 + 30 + 6
3.01.03.02A	identify and write a 4-digit number in standard form given its expanded notation; e.g., 1 thousand + 2 hundreds + 3 tens + 6 ones = 1000 + 200 + 30 + 6 = 1236
3.01.03.03B	regroup hundreds as thousands; e.g., 20 hundreds = 2 thousands
3.01.03.04B	regroup thousands as hundreds; e.g., 3 thousands = 30 hundreds
*3.01.03.05A	write 4-digit numbers with a comma between the thousands and hundreds places. e.g., 1234 = 1,234

VOCABULARY

TERMS

expanded notation
standard form
comma
regroup

GETTING STARTED 1:

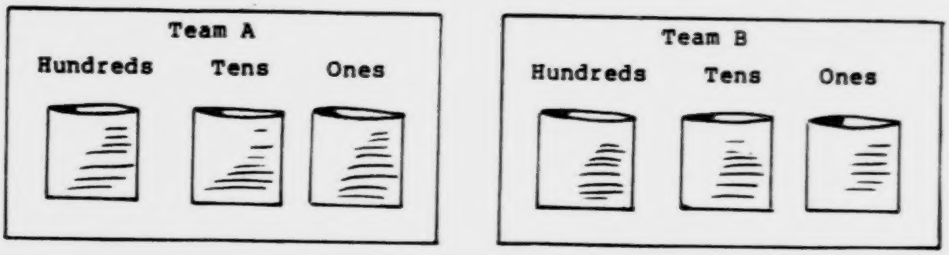
Prepare a set of flash cards with a different 3-digit number written on each card, e.g., 352. Divide the students into two teams. Say "Today we are going to play What's My Value. I will display a flash card with a 3-digit number written on it. (Include numbers with 0 in either the tens or the ones places and ask the students to explain the meaning of zero and why it must "hold the place.") I will say one of the digits in the number such as 3. In order to score a point for your team, you must identify the value of that digit. What is the value of the 3 in 352?" (The value of the 3 in 352 is 300.) Continue the game until all the students have had a chance to participate.

Say, "In the number 222, do all the two's have the same value? Explain." (Each two has a different value. The 2 on the left represents 200, the middle 2 represents 20, and the 2 on the right represents 2.)

GETTING STARTED 2:

Prepare 2 sets of cards, each set numbered from 0 through 9. Divide the students into two teams. Display two place value charts with pockets.

e.g.,



GETTING STARTED 2: cont'd

Mix the sets of cards and place them face down. Select one member from each team. Say, "Pick any card, turn it over, and place it in the pocket of a column on the place value chart." Repeat this procedure until each team has completed a 3-digit number. The student with the 3-digit number smallest in value wins the point for his/her team. Ask each student to explain how the point was made.

Repeat this procedure until each student has had an opportunity to participate.

Say, "If the digits 1, 2, and 3 are rearranged, how will their value change?" (For 123, the 1 represents 100, the 2 represents 20, and the 3 represents 3. For 231, the 2 represents 200, the 3 represents 30, and the 1 represents 1.)
Variation: The student whose number is greatest in value wins the point.

3.01.03

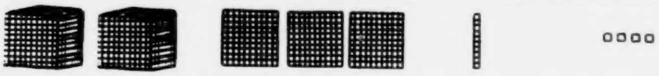
3.01.03.01 **identify and write 4-digit numbers in expanded notation**

STRATEGY 1: Prepare and display a place value chart and squared material (thousands, hundreds, tens, and ones). (A thousand may be made by placing a rubber band around a group of 10 hundreds.)

Say, "We have written 3-digit numbers in expanded notation. Today we will write 4-digit numbers in expanded notation. Let's count by hundreds to 1000. (100, 200, 300,...1000) What was the last number we counted?" (The last number was 1000.) Write 1000 on the chalkboard. Say, "How many places does 1000 have? (1000 has 4 places.) What is the value of each digit? (The 1 represents 1 thousand, the zeros equal 0 hundreds, 0 tens, and 0 ones.) Why are zeros used?" (Zeros are used as place holders.) Write 2314 on the chalkboard. Ask a student to write 2314 on the place value chart, read it aloud, and represent 2314 using squared material.

e.g.,

thousands	hundreds	tens	ones
2	3	1	4



Say, "How many thousands are there? (There are 2 thousands.) In what other way may we write 2 thousands?" (2 thousands may be written as 2000.) Continue this procedure for hundreds, tens, and ones indicating the expanded notation on a place value chart to be completed by the students.

e.g.,

	thousands	hundreds	tens	ones
2314 =	2 thousands +	3 hundreds +	1 ten +	4 ones
2314 =	2000 +	300 +	10 +	4
4702 =	____________ +	____________ +	______ +	______
4702 =	____________ +	____________ +	______ +	______

STRATEGY 1: cont'd

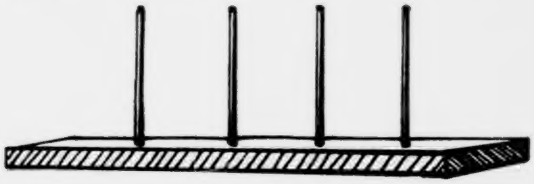
Ask the students to write these numbers in their notebooks, read the numbers, and indicate the number of thousands, hundreds, tens, and ones. Ask the students to write each number in expanded form in their notebooks.

Repeat this procedure with other 4-digit numbers.

STRATEGY 2:

Prepare and display (or draw on the chalkboard) an abacus with 4 places.

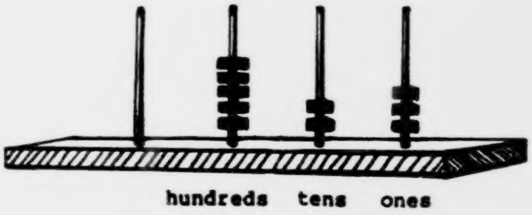
e.g.,



Say, "Each wire represents a different value. What do you think the wire on the right represents?" (The wire on the right represents ones.) Repeat this questioning through the thousands place. Say, "Why do we place no more than 9 beads on each wire?" (When we write numbers we cannot have more than one digit in each place. Since 10 is a 2-digit number we must exchange 10 beads for 1 bead which will be placed in the next column to the left.)

Display beads on the abacus.

e.g.,



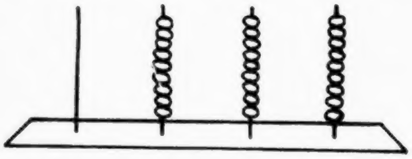
Say, "How many beads are in the ones column? (There are 3 beads in the ones column.) ... tens column? (... 2 beads ...) ... hundreds column? (... 5 beads ...) What number is represented on this abacus? (523 is shown on the abacus.) What does the 5 represent? (The 5 represents 5 hundreds. ... the 2? (... 2 tens.) ... the 3?" (... 3 ones.)

STRATEGY 2: cont'd

Ask a student to write 523 in expanded notation on the chalkboard, e.g., 523 = 500 + 20 + 3 Say, "The number 523, as written on the left, is the standard form of writing numbers. The form on the right is the expanded form of writing numbers."

Display the number 999 on the abacus.

e.g.,



Say, "What is one greater than 999? (1000 is 1 greater than 999.) If the next column on our abacus is the thousands column, how many beads must we place in the thousands column to show 1000? (1) ... hundreds column? (0) ...tens column? (0) ...ones column? (0) Why must we have these zeros?" (Zeros are used as place holders.)

Ask a student to write 1000 in expanded notation on the chalkboard, e.g., 1000 = 1000 + 0 + 0 + 0.

Repeat this procedure for other 4-digit numbers, with and without zeros, using an abacus or placing diagrams of abaci on the chalkboard and asking the students to write the expanded notation in their notebooks.

3.01.03.02 **identify and write a 4-digit number in standard form given its expanded notation**

STRATEGY 1: Prepare and display squared material (play money, bundles of sticks). Ask a student to use the squared material to display one thousand. (The student may place a rubber band 10 hundreds to show one thousand.) Say, "What is the value of this squared material? (The value is 1000.) Explain." (Ten hundreds equal one thousand.) Display 3 hundred squares, 5 ten strips, and 7 ones next to the 1000.

STRATEGY 1: cont'd

Ask a student to write 1000 on the chalkboard. Point to the 3 hundred squares. Say, "How many hundreds are there?" (There are 3 hundreds.) Ask a student to write 300 on the chalkboard. Repeat this procedure for the 5 tens and the 7 ones. When all the numbers are written in expanded notation on the chalkboard (1000 + 300 + 50 + 7) say, "What 4-digit number equals one thousand plus three hundred plus fifty plus seven?" (1000 + 300 + 50 + 7 equals 1357.) Write the following on the chalkboard:

1 thousand + 3 hundreds + 5 tens + 7 ones =
1000 + 300 + 50 + 7 = 1357

Ask the students to write these numbers into their notebooks.

Say "We started with the expanded form. Into what form was it changed?" (1000 + 300 + 50 + 7 was changed into standard form, 1357.)

Repeat this procedure using other expanded numbers.

Note: Be sure to include numbers that require 1 or more zeros as place holders in the hundreds, tens, and ones places, e.g., 3000 + 20 + 5 = 3025.

STRATEGY 2:

Write on the chalkboard:

1 thousand + 2 hundreds + 1 tens + 1 one
1 thousand + 1 hundred + 2 tens + 1 one
1 thousand + 1 hundred + 1 tens + 2 ones

Say, "These three numbers have the same four digits although they represent different values. Why do they represent different values? (The placement of the digits determines the value.) Look at the first expanded notation." Ask a student to show another way of writing one thousand by writing the numeral

STRATEGY 2: cont'd

underneath the word form. Repeat this procedure with the hundreds, tens, and ones. Remind the students to place a plus symbol between each place.

e.g.,

1 thousand + 2 hundreds + 1 ten + 1 one
1000 + 200 + 10 + 1

Say, "How can we change this expanded form into the standard form? (We can write each digit horizontally without the zeros which are the place holders.) How is the standard form written?" (We write 1211.) Ask a student to write the standard forms next to the expanded forms.

e.g.,

1 thousand + 2 hundreds + 1 ten + 1 one = 1211
1000 + 200 + 10 + 1 = 1211

Ask a student to read the standard form aloud.

Repeat this procedure with the other numbers written in expanded notation. Challenge students by asking whether they can use these 4 digits, 1, 2, 1, 1, to make another number with a different value from those already used, e.g., 2111.

3.01.03.03 regroup hundreds as thousands

STRATEGY 1: Prepare squared material. Place a rubber band around 9 groups of 10 hundreds until 9 thousands are displayed. Say, "Freddie loves to play video games. His favorite game is called Zap. Each time Freddie zaps he scores 100 points." Display one thousand. Ask a student to count the number of hundreds to find out the number of times Freddie scored. Say, "How many times did Freddie zap? (Freddie zapped 10 times.) How much is each zap worth? (Each zap is worth 100 points.)

STRATEGY 1: cont'd

Count by 100 to find the number of points Freddie scored. How many points did Freddie score? (Freddie scored 1000 points.) How did we get 1000?" (We counted 10 hundreds and that equals 1000.) On the chalkboard write, 10 hundreds = 1 thousand = 1000.

Repeat this procedure using 2 through 9 sets of squared material, each bundled into 1000 to demonstrate equivalent values.

e.g.,

20 hundreds = 2 thousands = 2000
90 hundreds = 9 thousands = 9000

STRATEGY 2:

Prepare and display squared material (9 thousands and at least 30 hundreds).

Say, "Ron and Veronica were playing a board game. Veronica kept landing on a square marked, 'Take one hundred.' She won 10 one hundred squares. 10 hundred squares were too much for her to hold. What could she exchange for 10 hundreds?" (She could exchange 10 hundreds for 1 thousand.) Ask a student to count out the hundreds. Say, "What is another way to read 10 hundreds? (We can read 10 hundreds as one thousand.) What is another name for 10 one hundreds? (One thousand is another name for 10 one hundreds.) When did we regroup hundreds as thousands?" (We regrouped hundreds as thousands when we had 10 hundreds.)

Repeat this procedure for 20 hundreds through 90 hundreds. Complete this chart as the answers are given and write them on the chalkboard.

e.g.,

10 hundreds = 1 thousand = 1000
20 hundreds = 2 thousand = ____
30 hundreds = __________ = ____
40 hundreds = __________ = ____ ...

3.01.03

3.01.03.04 regroup thousands as hundreds

STRATEGY 1: Prepare several groups of hundred squares with 10 hundreds in each group. Display one group (one thousand block). Ask a student to count the number of hundred squares which make the thousand block. Say, "How many hundreds equal 1 thousand? (1 thousand equals 10 hundreds.) When counting by hundreds, after which hundred do you reach 1 thousand?" (You reach 1000 after 900.)

Repeat this procedure for other blocks of thousands, e.g., 2 thousands equals 20 hundreds.

STRATEGY 2: Say, "Mr. Lotto Winner had trouble spending his money at the local stores because he only carried thousand dollar bills. He went to the bank to exchange his thousand dollar bills for hundred dollar bills. How many hundred dollar bills did the bank teller give him for each thousand dollar bill?" (The bank teller gave him 10 hundred dollar bills for each thousand dollar bill.) Ask the student to count by hundreds until he/she reaches 1000.

Repeat this procedure for 2 through 9 one thousand dollar bills.

Ask the students to complete a chart which shows thousands regrouped as hundreds.

e.g.,

1000 = 1 thousand = 10 hundreds
2000 =___thousand = ________
3000 =____________ = ________ ...

3.01.03

3.01.03.05 **write 4-digit numbers with a comma between the thousands and hundreds places**

STRATEGY 1: Ask a student to write the number 2978 on the chalkboard. Say, "When we write 4-digit numbers we sometimes use a comma to group the digits in a number so that it will be easier to read. We need to know where to place the comma. We count 3 places from the right and place the comma between the digit in the hundreds place and the digit in the thousands place. In 2978 what digit is in the hundreds place? (9 is in the hundreds place.) What digit is in the thousands place? (2 is in the thousands place.) Where should we place the comma?" (The comma is placed between the 9 and the 2.) Ask a student to come to the chalkboard and write the comma in the proper place, e.g., 2,978.

Say "How do we read this number?" Elicit and write on the chalkboard: This number is read as two thousand, nine hundred, seventy-eight. Repeat this procedure with several 4-digit numbers. Then dictate several 3- and 4-digit numbers for the students to write in their notebooks using commas where appropriate. Say, "Why do we use commas with 4-digit numbers?" (A comma is used to show the thousands place. It is used to group the digits to make it easier to read the number.)

P.O. 3.01.03.01-.02

NAME:______________________________ CLASS:________ DATE:________

Cut out the words and numbers along the dotted lines. Match each number to its expanded notation.

7528	2000+900+90+5	6205
4 thousand + 3 ones	4002	1100
6,000 + 200 + 5	7000+500+20+8	2469
2000+400+60+9	1 thousand + 1 hundred	6000+300+10+1
7050	4003	4000 + 2
2995	6311	7 thousand + 5 tens

CHALLENGE!

What is an odd 3-digit number with the sum of its digits equal to 4? ______________

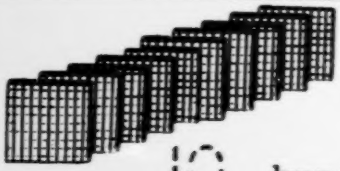
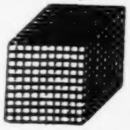
What is an odd 4-digit number with the sum of its digits equal to 4? ______________

P.O. 3.01.03.03-.04

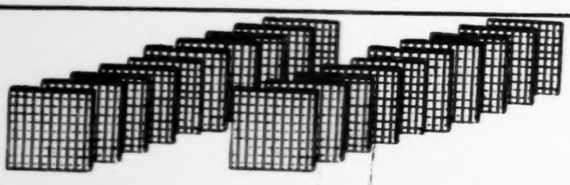
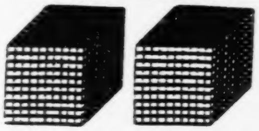
NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

Regroup the hundreds as thousands.

10 hundreds = 1 thousand = 1000

______ hundreds = ______ thousands = ______

30 hundreds = ________ thousands = ________

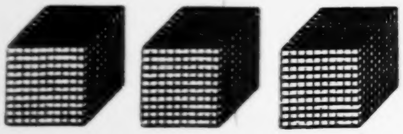
50 hundreds = ________ thousands = ________

70 hundreds = ________ thousands = ________

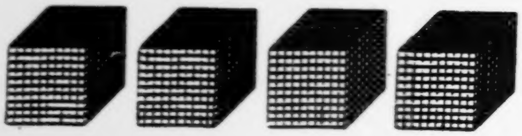
90 hundreds = ________ thousands = ________

60 hundreds = ________ thousands = ________

Regroup the thousands as hundreds.



____ thousands = ____ hundreds



____ thousands = ____ hundreds

5 thousands = ________ hundreds

2 thousands = ________ hundreds

8 thousands = ________ hundreds

6 thousands = ________ hundreds

1 thousand = ________ hundreds

P.O. 3.01.03.05

NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

Commas help us read large numbers.

Write commas where they belong.

4963
325
9000
38
2163
7452
8321

68
275
4392
150
6500
7553
1002

6457
8312
900
9000
42
5213
3636

Do you remember?

1. How many days are in this year? ________
2. What month has an extra day every four years? ________
3. How many weeks are in one year? ________
4. What is the tenth month of the year? ________
5. Write today's date using only numerals. ________

SHARPENING YOUR SKILLS

Units 7, 8

Name: ____________ **Class:** ________ **Date:** ________

Round each 3-digit number to the nearest hundred.

1. 276 rounded to the nearest hundred is ______.

2. 450 rounded to the nearest hundred is ______.

2. 148 rounded to the nearest hundred is ______.

4. 549 rounded to the nearest hundred is ______.

Round each number to the nearest ten.

5. 451 to the nearest ten is _____.

ⓐ 450
ⓑ 500
ⓒ 400
ⓓ 460

6. 295 to the nearest ten is ____.

ⓐ 285
ⓑ 290
ⓒ 250
ⓓ 300

Regroup each number as thousands. Write the comma in its proper place.

8. 40 hundreds = _____

9. 10 hundreds = _____

10. 90 hundreds = _____

11. 70 hundreds = _____

Regroup as hundreds.

12. 4 thousands = ___ hundreds

13. 6 thousands = ___ hundreds

Write each number in standard form.

14. 2 thousand + 4 tens + 5 ones = __________

15. 7 thousand + 1 hundred + 6 tens = __________

16. 1 thousand + 3 hundreds + 1 ten + 8 ones = __________

17. 9 thousand + 3 hundreds + 7 ones = __________

3.01.04 ORDER NUMBERS THROUGH 9,999

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.01.04.01A order 3-digit numbers in both increasing and decreasing orders;
e.g.,

314; 624; 187 in
increasing order:
187; 314; 624

314; 624; 187
in decreasing order:
624; 314; 187

3.01.04.02B order 4-digit numbers in both increasing and decreasing orders.
e.g.,

4,328; 7,040; 2,199
in increasing order:
2,199; 4,328; 7,040

4,328; 7040; 2,199
in decreasing order:
7,040; 4,328; 2,199

3.01.04

VOCABULARY

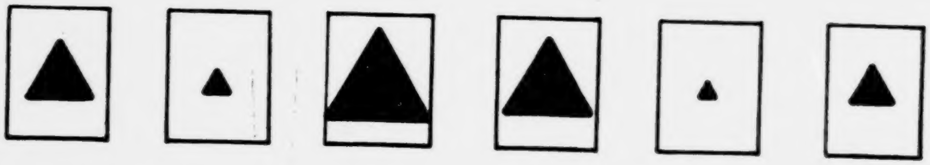
TERMS

increasing
decreasing
ascending
descending

GETTING STARTED 1:

Prepare groups of six cards, each card showing a shape in a different size.

e.g.,



Mix the cards and ask the students to order the shapes from the smallest to the largest. Mix the cards again and ask another student to order the shapes from the largest to the smallest.

Say, "If we number the smallest triangle 1 and the next bigger triangle 2, what number will the largest triangle be?" (The largest triangle will be 6.)

GETTING STARTED 2:

Prepare and randomly display cards with 2-digit numbers.

e.g.,

53 46 19 36 75

Say, "Carla's father is a train engineer. Each day he rides the train uptown turns around and goes downtown. These are the numbers of the train stations he passes. If he starts downtown, what station will he pass first?" (He will pass station 19.) Ask a student to arrange the cards (stations) in the numerical order in which the train rides uptown. Say, "What is the last station at which Carla's father stops on his way uptown?" (The last station is 75.) Say, "How are the stations arranged?" (The stations are arranged in order from the lowest number to the highest number.)

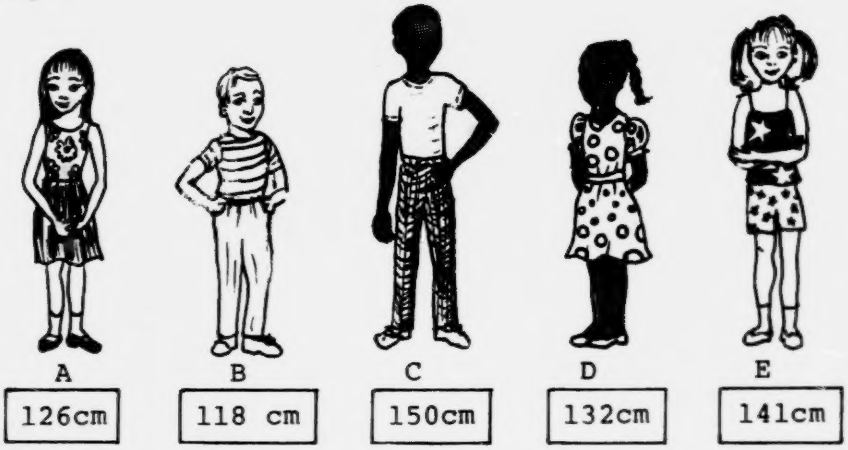
Repeat this procedure for the train ride downtown.

3.01.04

3.01.04.01 **order 3-digit numbers in both increasing and decreasing orders**

STRATEGY 1: Prepare height cards in centimeters for five students who vary in height. Say, "We arranged cards with various size shapes in size order. Now we will do the same thing with students' heights." Ask several students to stand in random order at the front of the room.

e.g.,



Ask the shortest child (B) to stand next to you and to display his/her height card. Say, "Who should stand next to B if we stand in size order from the shortest to the tallest? (A should stand next to B.) Explain. (A is a little taller than B.) Can you find another way to explain that?" (B's card shows 118cm and A's card shows 126cm, therefore A's card comes next in increasing order.)

Repeat this procedure until everyone is in size order from the shortest to the tallest. Say, "How does the order compare when we arrange the students from the tallest to the shortest?" (The numbers, the height in centimeters, would then be in decreasing order from the highest to the lowest number.) On the

STRATEGY 1: cont'd

chalkboard write:

Increasing order: 118 cm, 126 cm,...150 cm
Decreasing order: 150 cm, 141 cm,...118 cm

STRATEGY 2:

Prepare a number cube numbered 1 through 6. Say, "The stations along Carla's father's train route were arranged in numerical order from the lowest number to the highest as he traveled from downtown to uptown. All the stations had 2-digit numbers. Now we will be arranging 3-digit numbers in increasing and decreasing order." Roll the number cube. In the first box at the chalkboard record the number which appears on top. Repeat this procedure two more times, recording the results in the second and third boxes.

e.g.,

4 First Box	2 Second Box	6 Third Box

Ask the students to arrange the digits 4, 2 and 6 in as many 3-digit combinations as possible in increasing order. Say, "How many different 3-digit numbers did you discover? (There are six ways to arrange the 3 digits.) What 3-digit numbers are possible? (246, 264, 624, 642, 426, 462) How did you arrange them in increasing order? (They were arranged as follows: 246, 264, 426, 462, 624 and 642.) How would the numbers be arranged in decreasing order?" (They would be arranged as follows: 642, 624, 462, 426, 264, and 246.) Summarize these findings on the chalkboard.

Say, "How many 3-digit numbers could you make if you rolled three numbers which were all the same? (You could only make one number, e.g. 333.) How many 3-digit numbers could you make if you rolled 2 of the same numbers and 1 different number? (There would be

STRATEGY 2: cont'd

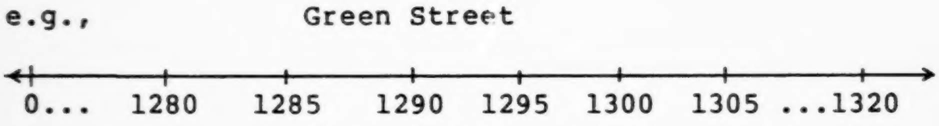
only three possible numbers, e.g., 344, 434, 443.) How would you arrange the numbers in increasing order?" (Compare any two numbers, e.g., 344 and 434. 344 comes before 434 because it is less than 434. It has a 3 in the hundreds place. 434 has a 4 in the hundreds place.) Provide opportunities for the students to roll the number cube and arrange the possible 3-digit numbers in increasing and decreasing orders. Say, "What is the rule for ordering 3-digit numbers?" Elicit the following rule and write it on the chalkboard.

RULE: When ordering 3-digit numbers, first compare the hundreds, then the tens, then the ones.

3.01.04.02 **order 4-digit numbers in both increasing and decreasing orders**

STRATEGY 1: Display a number line showing multiples of five from 1280 through 1320 and envelopes with matching numbers.

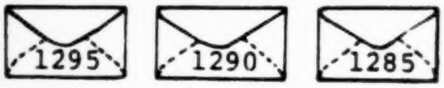
e.g.,



Say, "Keith's father is a postman. The number line shows the numbers of the houses on his route along Green Street. He begins his ride each day from the post office at 1280 Green Street and walks uptown."

Place the numbered envelopes shown below on the chalkboard ledge.

e.g.,



Ask a student to arrange the envelopes for Keith's father so that he makes his stops in order as he

STRATEGY 1: cont'd

drives uptown. Say, "Which number comes first? (1285 Green Street would be the first stop.) Which digits help you decide the order?" (The digits in the ones and the tens places help to order the numbers. The digits in the hundreds and the thousands places are the same on the envelopes placed on the ledge.)

Repeat this procedure until the numbers are in order.

Display envelopes numbered 1290, 1305, 1295, and 1310. Say, "How would you arrange the numbers on these envelopes in order?" (I would compare the digits in the thousands place first. Then I would compare the digits in the hundreds place. 1290 and 1295 come before 1305 and 1310. Next, I would compare the digits in the tens place. Since 1290 and 1295 would have the same 3 digits in the tens, hundreds, and thousands places, I would go to the ones place and compare them. 0 is less than 5 so 1290 comes before 1295. The correct order for the envelopes is 1290, 1295, 1305, and 1310.) Summarize these findings on the chalkboard.

Repeat this procedure for arranging numbers in decreasing order when delivering the mail from uptown to downtown. Say, "When Keith's father delivers the mail, he begins downtown and the numbers increase. What happens to the house numbers if he starts uptown and walks downtown?" (The numbers decrease as he walks downtown.) Elicit the following rule and write it on the chalkboard.

RULE: When ordering 4-digit numbers, first compare the thousands, then the hundreds, then the tens, and then the ones.

P.O. 3.01.04.01

NAME: ________________ CLASS: ________ DATE: ________

Follow the directions in each part.

Rewrite the numbers in increasing order.

A. 301, 476, 211 211, 301, 476

B. 725, 516, 945 ____, ____, ____

C. 799, 802, 796 ____, ____, ____

Rewrite the numbers in decreasing order.

A. 269, 525, 102 525, 269, 102

B. 965, 988, 452 ____, ____, ____

C. 630, 220, 650 ____, ____, ____

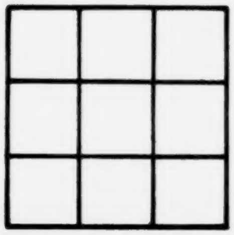
Write increasing or decreasing for each group of numbers.

A. 306, 513, 603 increasing

B. 671, 617, 611 ____________

C. 403, 314, 304 ____________

CHALLENGE!



How many squares are there?

There are ________ squares.

P.O. 3.01.04.02

NAME: ______________________ CLASS: ________ DATE: ________

Arrange the house numbers in increasing order, by mailing address.
Arrange the house numbers in the return addresses in decreasing order.

R. Watkins
7041 Truman Dr.
Brooklyn, N.Y. 11235

Mr. Jack Best
6554 Gray Blvd.
New York, N.Y. 10029

M. Johns
4027 Truman Dr.
Brooklyn, N.Y. 11235

Ms. Joan Hand
5886 Gray Blvd.
New York, N.Y. 10029

J. Smith
6056 Truman Dr.
Brooklyn, N.Y. 11235

Mr. Bill Jones
7429 Gray Blvd.
New York, N.Y. 10029

B. Brown
4196 Truman Dr.
Brooklyn, N.Y. 11235

Ms. Carol Jackson
7436 Gray Blvd.
New York, N.Y. 10029

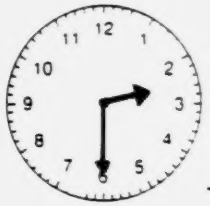
Write the house numbers of mailing addresses in increasing order.

________ ________ ________ ________

Write the house numbers of return addresses in decreasing order.

________ ________ ________ ________

Do you remember? What time is shown on each clock?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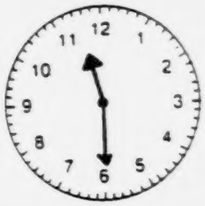
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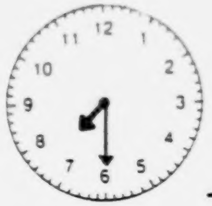
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3.13.01 GUESS AND CHECK

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.13.01.01A make and verify a guess;

e.g.,

How many steps will you take to cross the room?

3.13.01.02A check his/her guess against problem conditions.

e.g.,

I am holding 3 coins.
No two coins are alike.
The total is 40¢.
What are the coins?

VOCABULARY

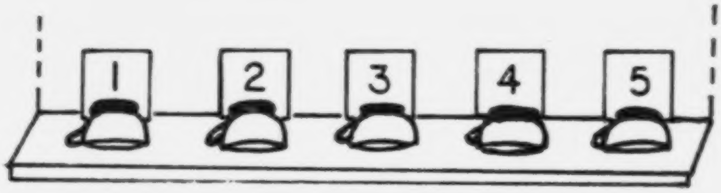
TERMS

guess
verify
check

GETTING STARTED 1:

Prepare several small objects (chalk, chip, coin) and five cups. Place the cups upside down. Designate the position of each cup with a number.

e.g.,

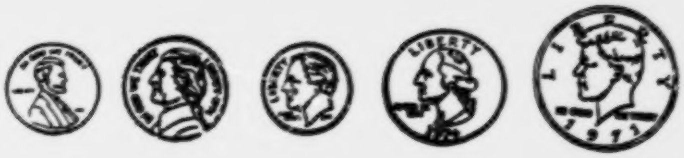


Display one small object. Place the object under one of the cups. Say, "Watch my movements carefully as I move the overturned cups without removing the object. Can you guess where the object is now?" Ask a student to verify his/her guess. If the student is correct, he/she can now hide an object and move the cups. Repeat this procedure so that the students can practice making guesses.

Say, "Why did you pick the cup you did? (It was just a guess.) How did you determine if your guess was correct? (I lifted the overturned cup.) What would you guess if I told you the small object was under a cup with an odd number. (I would guess either 1, 3, or 5.) How can you make a better guess?" (I can make a better guess with more information.)

GETTING STARTED 2:

Display models of coins on the chalkboard.
e.g.,



Ask the students to describe the attributes and values of each coin, e.g., A quarter is larger than a dime, a penny shows the face of Abraham Lincoln, a nickel equals five cents. These attributes and values will be the clues and hints used by the students to guess intelligently.
Place one of each coin in a brown paper bag. Say, "I will take a coin from the bag. Guess which coin I have in my hand." Ask each student to guess until one student guesses correctly. Say, "Did I give you any information to help you with your guesses? (No.) You had to make wild guesses. What can I do to help you make a better guess? (You must give us more clues or hints. I am holding a silver colored coin. How does that information help you? (I know it is not a penny.) Do you know which coin I am holding? (No, we need more clues.) Here is a second clue or hint. Its value is greater than 10¢. Does that information help you? (Yes, the coin is not a nickel or a dime. It could be either a quarter or a half-dollar.) Here is a third clue or hint. It is the largest coin in size and value. What is it?" (It is the half-dollar.)

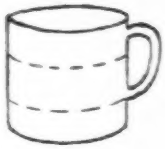
Say," The coin was a half-dollar. How were your guesses different after each clue?" (After each clue we were able to eliminate some coins. The hints and clues helped us make better guesses because now the guesses were based upon some information.)

3.13.01

3.13.01.01 **make and verify a guess**

STRATEGY 1: Prepare and distribute to several groups of students a cup and a supply of beads, chips, or other small objects. Each cup should show two lines designating different levels.

e.g.,



Say, "Look at the objects. Can you guess how many objects are needed to reach the first line on the cup?" Record the students' guesses on the chalkboard.

e.g.,

Name	Guess
Alvin	
Benita	
Cora	

Say, "Place objects in the cup until they reach the first line. Count the number of objects in the cup. How many objects reached the first line?" (Record the answer on the chalkboard.) Check the answers against the students' guesses to see which guess came closest. Repeat this procedure for the second line on the cup and then for the whole cup.

Say, "How would you compare your second and third guesses with your first guess? (The second and third guesses were closer because I had information which helped me make a good guess.) How would your guess change if we used very tiny beads?" (The number of beads needed to reach the first line would have been greater.)

STRATEGY 2: Ask the students to write three sentences to describe themselves.

e.g.,

I have blue eyes.
I play soccer.
I like to eat peanut butter.

Say, "Do not write your name on the paper. I will collect the papers and place them in a bag. A student will pick a paper from the bag and read the description to the class. Listen carefully to the description and try to guess who the person is. If you guess correctly, the person who is described will have a turn to pick from the bag."

Say, "Explain how you made your guess. (I made my guess based upon the information I heard.) How could you have made an even better guess? (If I had more clues, hints, and information I could have made a better guess.) Would it have been even easier if you knew the person's first name?" (That would be very easy, unless there were two people with the same first name.)

Repeat this procedure for the other descriptions.

3.13.01.02 check his/her guesses against problem conditions

STRATEGY 1: Say, "Today you will see how good you are at guessing. I will give you clues that will help you guess a secret number." Say and write one clue at a time on the chalkboard, eliciting responses after each clue.

e.g.,

Clue 1: It is a 2-digit number between 0 and 20. What numbers are possible? (11, 12, 13 ...19 are possible.)

Clue 2: It is an odd number. What numbers are now possible? (11, 13, 15, 17, 19 are possible.)

Clue 3: The sum of the digits is 6. What is the number? (The number is 15.)

STRATEGY 2: Prepare demonstration money. Write a problem on the chalkboard.

e.g.,

> John wants to buy a can of juice from the juice machine. The juice costs 40¢. The machine will release the juice if 3 different coins totalling 40¢ are inserted. What three coins must John use in order to buy the juice?

Ask the students to read the problem and to guess the solution. Write the guesses on the chalkboard, e.g., 1 penny, 1 dime, 1 quarter. Say, "What is the value of these three coins? (36¢) Can these be the 3 coins John needs? (No.) Why not?" (John's coins must total 40¢.) Continue with other guesses until the correct combination of coins is found. Say, "Would 3 pennies have worked? (No, they are not different coins.) Would a penny, a nickel, and a dime have worked? (No, although they are three different coins they do not meet one of the problem conditions; a total of 40¢.) How did you determine that the answer was correct?" (I checked my answer against the problem conditions.)

Repeat this procedure using other problems in which the students can check their guesses against the problem conditions.

P.O. 3.13.01.01

NAME: ______________________ CLASS: ________ DATE: ________

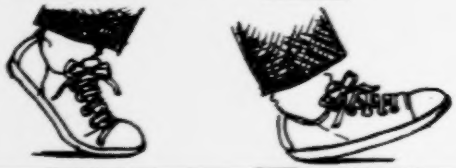
Read each question. Guess the answer. Check your answer.

How many hands will it take to go across your desk?

Guess____ Measure____

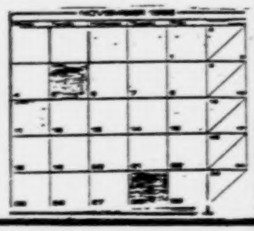
How many steps will it take you to walk from one side of the classroom to the other side?

Guess____ Measure____



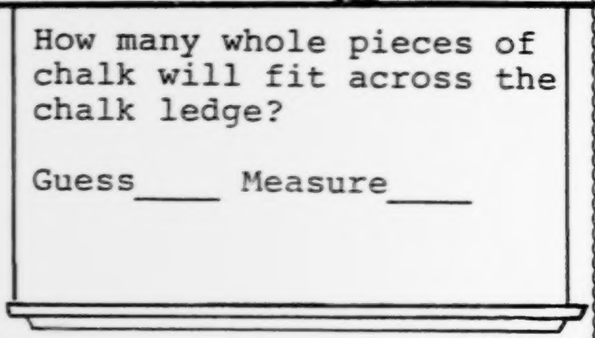
How many days will it be until the next holiday?

Guess____ Measure____



How many whole pieces of chalk will fit across the chalk ledge?

Guess____ Measure____



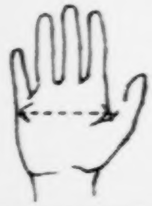
How many times can you count to ten in a minute? (Work with a partner.)
1 2 3 4 5 6 7 8 9 10

Guess____ Measure____

55
5
50
10
45
15
40
20
35
30
25

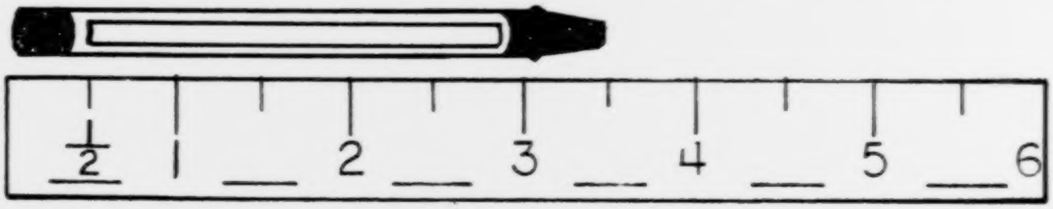
How many inches wide is your palm?

Guess____ Measure____



Do you remember? Complete the markings on the ruler.

The crayon measures ____ inches.



P.O. 3.13.01.02

NAME: ______________________ **CLASS:** __________ **DATE:** ________

Guess and check to find the mystery number.
Write the mystery number in the box.

The mystery number comes after 20 but before 30.
(21, 22, 23, 24, 25, 26, 27, 28, 29)

The number is even.
(22, 24, 26, 28)

If you add its digits together the sum is ten.
(2+2 =4, 2+4=6, 2+6=8, 2+8=10)

Can you find the mystery number? ☐

The mystery number is between 10 and 20.
(   )

It is an odd number.
(   )

When you subtract the first digit from the second digit the difference is four.
(   )

Can you find the mystery number? ☐

The mystery number is larger than 40 but smaller than 50.
(   )

It is an even number.
(   )

When you subtract the first digit from the second digit the difference is 2.
(   )

Can you find the mystery number? ☐

Do you remember?

The Smith family took an automobile trip. They traveled 482 miles the first day and 364 miles the second day. How many more miles did they travel the first day? __________

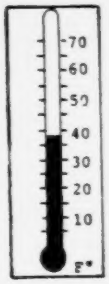
3.10.03 TEMPERATURE - FAHRENHEIT AND CELSIUS THERMOMETERS

(1 lesson/ongoing)

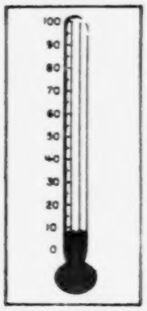
PERFORMANCE OBJECTIVES

The student will be able to...

3.10.03.01A recognize and read a Fahrenheit thermometer to the nearest five degrees, ten degrees; e.g.,


70
60
50
40
30
20
10
F°

3.10.03.02A recognize and read a Celsius thermometer to the nearest five degrees, ten degrees. e.g.,


100
90
80
70
60
50
40
30
20
10
0

3.10.03

VOCABULARY

TERMS	SYMBOLS
degree	°
Fahrenheit	F°
Celsius	C°

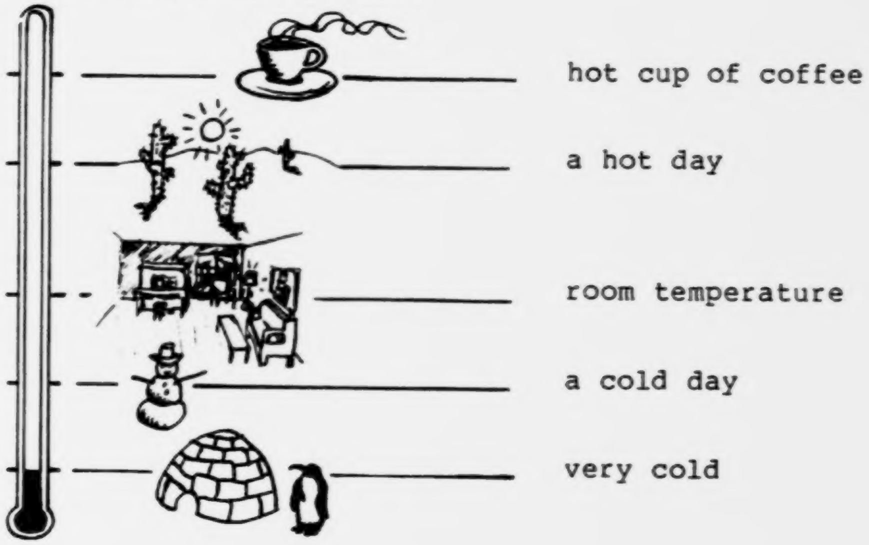
GETTING STARTED 1:

Say, "What kind of weather are we having today? Is it hot, warm, cold, or cool? (Accept any appropriate response.) How can we measure exactly how warm or how cold it is outside? (We can use a thermometer.) What unit of measure is used to measure temperature? (A degree is the unit used for measuring temperature.) What do you like to do outside when the thermometer shows that it is hot?... warm?... cold?... cool?" (Accept any appropriate response, e.g., I like to swim...play ball...rake the leaves...build a snowman.)

GETTING STARTED 2:

Prepare and display a ribbon thermometer. Instead of numbers, use pictures and labels as markers.

e.g.,



Say, "This thermometer shows different temperatures. Which part of the thermometer shows very cold temperatures?... very warm

GETTING STARTED 2: cont'd

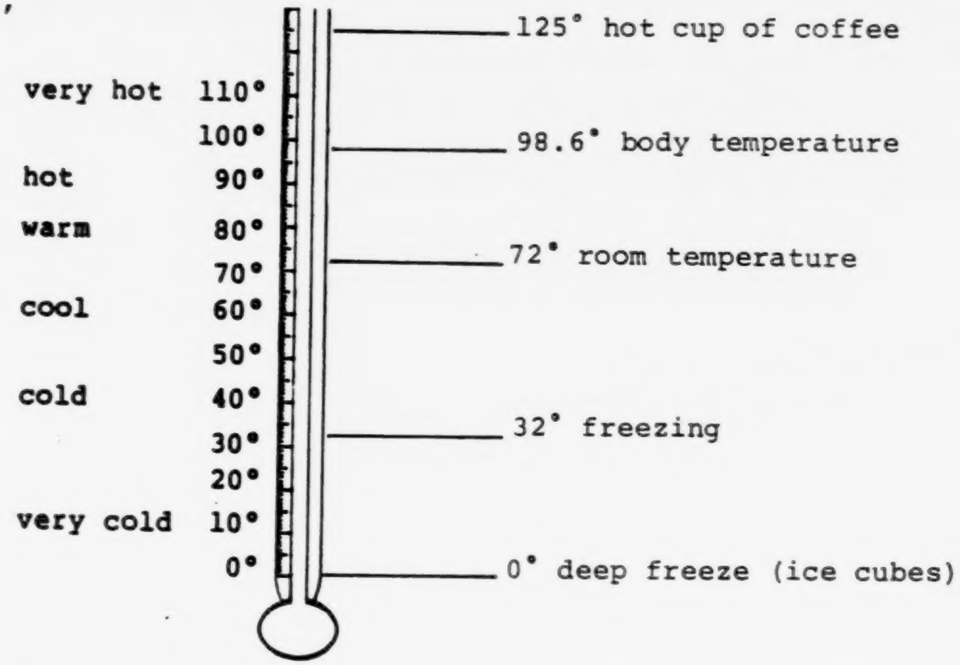
temperatures? (The bottom of this thermometer shows very cold temperatures. The top of this thermometer shows very hot temperatures.) What happens to the red mark as the temperature increases ?...decreases?" (As the temperature increases, the red mark moves toward the top of the thermometer. As the temperature decreases the red mark moves toward the bottom.) Ask a student to move the ribbon on the thermometer to show a hot bowl of soup...to show that it is cold enough to go skating...warm enough to go swimming... cold enough to build a snowman. Say, "A real thermometer has a special liquid inside of it. When the weather gets warmer, the temperature goes up and the liquid inside the thermometer rises. What happens when the weather gets cooler?" (The temperature goes down and the liquid falls.)

3.10.03

3.10.03.01 **recognize and read a Fahrenheit thermometer to the nearest five degrees, ten degrees**

STRATEGY 1: Prepare and display a Fahrenheit ribbon thermometer. Use numbers and labels as markers.

e.g.,


125° hot cup of coffee
very hot 110°
100°
98.6° body temperature
hot 90°
warm 80°
72° room temperature
70°
cool 60°
50°
cold 40°
32° freezing
30°
20°
very cold 10°
0°
0° deep freeze (ice cubes)

Say, "We have learned that the temperature indoors and outdoors can be cold or hot, cool, or warm. What do we use to measure the temperature? (A thermometer measures the temperature.) How do we know, when looking at a thermometer, whether it is warm or cool?" (When it is warm, the liquid is higher. When it is cool, the liquid is lower.)

Say, "This is a Fahrenheit thermometer. The temperature at which water boils is 212°. The temperature at which water freezes is 32°." Point out other temperatures on the thermometer, e.g., body temperature, a cold day, a hot day, room temperature, a deep freeze. Ask the students to move the ribbon to show the various temperatures on the thermometer.

STRATEGY 1: cont'd

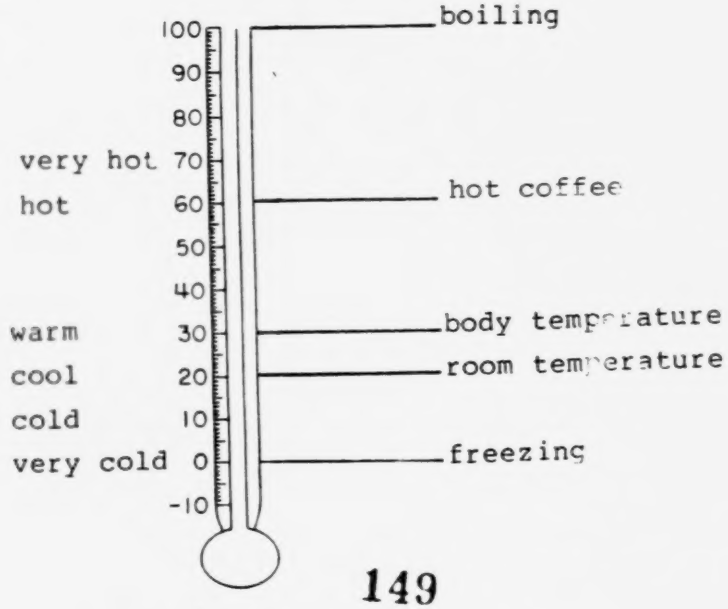
Move the ribbon to 73°. Say, "Between what two numbers is 73°? (73° is between 70° and 75°.) Where is it closer? (It is closer to 75°.) We can say the temperature is about 75°." Repeat this procedure with other examples. Ask the students to read the temperatures to the nearest five or ten degrees. Reverse the procedure by naming a temperature, e.g. 28°, and asking a student to move the ribbon to show that temperature to the nearest five or ten degrees.

Say, "We have learned that the temperature indoors and outdoors can be cold or hot, cool, or warm. What do we use to measure the temperature? (A thermometer measures the temperature.) How do we know, when looking at a thermometer, whether it is warm or cool?" (When it is warm, the liquid rises and appears higher. When it is cool, the liquid falls and appears lower.)

3.10.03.02 **recognize and read a Celsius thermometer to the nearest five degrees, ten degrees**

STRATEGY 1: Prepare and display a Celsius thermometer. Use numbers and labels as markers.

e.g.,


100
boiling
90
80
very hot 70
hot 60
hot coffee
50
40
warm 30
body temperature
cool 20
room temperature
cold 10
very cold 0
freezing
-10

STRATEGY 1: cont'd

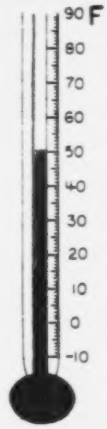
Say, "What kind of thermometer is used to show freezing at 32° and boiling at 212°? (A Fahrenheit thermometer shows freezing at 32° and boiling at 212°.) There is another kind of thermometer called a Celsius thermometer. How is the Celsius thermometer like the Fahrenheit thermometer? (Both thermometers have numbers and measure temperature in degrees.) How is it different? (The unit of measure is different for the two thermometers.) We read the temperature on a Celsius thermometer as degrees Celsius. The temperature at which water will boil is 100° Celsius...at which water will freeze is 0° Celsius." Demonstrate by moving the ribbon on the thermometer. Point out other temperature situations on the thermometer, e.g., room temperature, body temperature. Ask the students to move the ribbon to show the various temperatures on the thermometer. Summarize by asking one student to set the thermometer to any temperature. Ask another student to read the temperature to the nearest five or ten degrees. Repeat this procedure with other pairs of students.

P.O. 3.10.03.01-.02

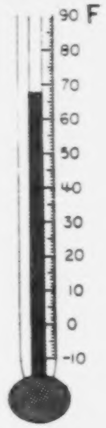
NAME: ______________________ CLASS: ________ DATE: _______

Follow the directions below.

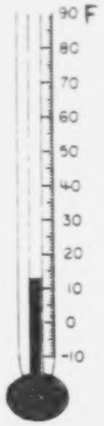
Write the temperature shown on each Fahrenheit thermometer to the nearest ten degrees.


90 F
80
70
60
50
40
30
20
10
0
-10

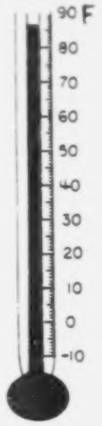
50° F


90 F
80
70
60
50
40
30
20
10
0
-10

____


90 F
80
70
60
50
40
30
20
10
0
-10

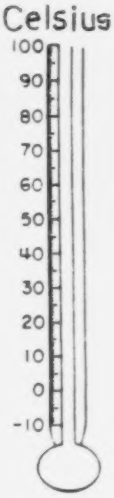
____


90 F
80
70
60
50
40
30
20
10
0
-10

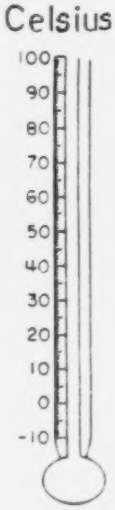
____

Use the chart to help you fill in the Celsius thermometer to the nearest 5 degrees.

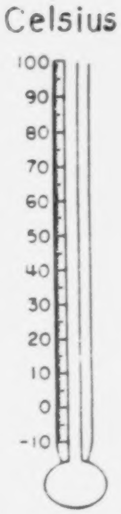
Water Boils	100°C
Hot Day	50°C
Body Temperature	38°C
Room Temperature	20°C
Cool Day	18°C
Water Freezes	0°C


Celsius
100
90
80
70
60
50
40
30
20
10
0
-10

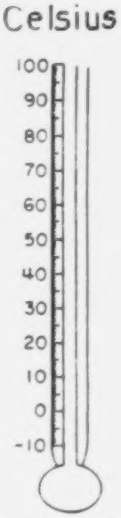
Room Temperature


Celsius
100
90
80
70
60
50
40
30
20
10
0
-10

Body Temperature


Celsius
100
90
80
70
60
50
40
30
20
10
0
-10

Water Freezes


Celsius
100
90
80
70
60
50
40
30
20
10
0
-10

Water Boils

SHARPENING YOUR SKILLS

Units 9, 10, 11

Name: ____________________ **Class:** __________ **Date:** __________

1. Which set of numbers is arranged in order from the least to the greatest?

ⓐ 294, 249, 429, 924

ⓑ 732, 723, 327, 372

ⓒ 158, 185, 518, 581

2. Write these numbers in order from the greatest to the least:

588 , 608 , 598

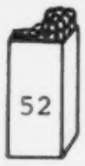
________, ________, ________

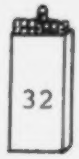
3. Use the number cards below to complete the grid. Each column and row should equal a sum of 15.

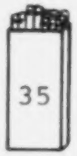
4	3	8
9		
	7	

1 2 ~~3~~ ~~4~~ 5 6

4. Your teacher needs 87 pencils. Place an X on the two boxes of pencils you will give her.





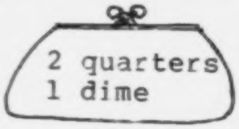


5.
Sandwiches		Drinks	
Cheese	$1.25	Milk	$.30
Turkey	$1.30	Juice	$.50
Chicken	$1.40	Shake	$.40

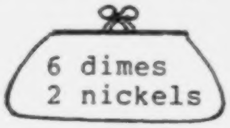
Mac spent $1.65 for a sandwich and a drink. What did he have for lunch?

Sandwich _____ Drink _____

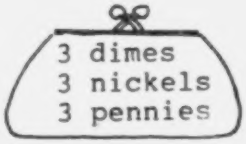
6. Which purse has the most money?


2 quarters
1 dime

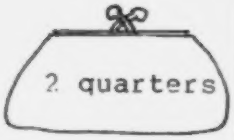
ⓐ


6 dimes
2 nickels

ⓒ

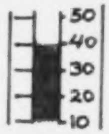

3 dimes
3 nickels
3 pennies

ⓑ

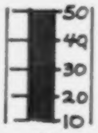


ⓓ

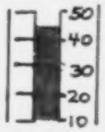
7. Which thermometer shows about 45° Fahrenheit?


50
40
30
20
10

ⓐ

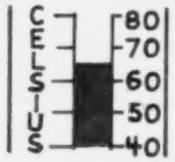

50
40
30
20
10

ⓑ


50
40
30
20
10

ⓒ

8. What is the temperature shown on the thermometer?


CELSIUS
80
70
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70°C 65°C 60°C

ⓐ ⓑ ⓒ

Unit 12

3.04.01 MULTIPLICATION FACTS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.04.01.01A write multiplication facts for numbers 1 through 5 in horizontal and vertical formats;

e.g.,

$$\begin{array}{r} 2 \\ \underline{\times 5} \\ 10 \end{array} \qquad 5 \times 2 = 10$$

3.04.01.02A state multiplication facts by filling in the blanks in a multiplication table;

e.g.,

x	0	1	2	3	4	5
0			0			
1			2			
2	0	2	4	6	8	10
3			6			
4			8			
5			10			

3.04.01.03A use the commutative property of multiplication.

e.g.,

$$5 \times 2 = 2 \times 5$$

3.04.01

VOCABULARY

TERMS

rectangular array	vertical
commutative property	factor
horizontal	

GETTING STARTED 1:

Distribute 25 discs to each student or group of students. Ask the students to make 5 equal piles of discs. Say, "How many discs are in the first group? (There are 2 discs in the first group.)...the first and second groups?" (There are 4 discs in the first and second groups.) Record the following on the chalkboard:

1 group of two = 2
2 groups of two = 4

Say, "How would you describe the total number of piles?" (5 groups of 2 = 10.)

Repeat this procedure of grouping, counting, and recording by threes, fours, and fives.

GETTING STARTED 2:

Prepare and distribute graph paper and four different color crayons to each student. Ask the students to write a counting number in each box starting at 1 and ending at 50. When the students have completed the chart say, "Count by twos and circle each number in red." Ask a student to read the circled numbers.

e.g.,

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Repeat this procedure for threes, fours, and fives, using a different crayon to circle each number pattern.

Say, "Each color represents a different pattern. Patterns help us learn number facts easily."

3.04.01

3.04.01.01 **write multiplication facts for numbers 1 through 5 in horizontal and vertical formats**

STRATEGY 1: Prepare and distribute 25 discs (cubes, chips) to each student or group of students. Draw four circles at the chalkboard, e.g., ○○○○ Say, "Can you describe this array?" (1 group of four = 4) Draw another row of four circles below it. Say, "How would you describe this array?" (2 groups of four = 8.) Use your discs to make the same model. Let's write a multiplication story about the array."

e.g.,

1 group of four = 4 ○ ○ ○ ○

+ 1 group of four = 4 ○ ○ ○ ○

2 groups of four = 8

$2 \times 4 = 8$ or $\begin{array}{r} 4 \\ \times 2 \\ \hline 8 \end{array}$

Repeat this procedure using different arrays and recording each multiplication example in both horizontal and vertical formats. Reverse the procedure by writing number sentences on the chalkboard in both horizontal and vertical formats and asking the students to model them at their desks with arrays.

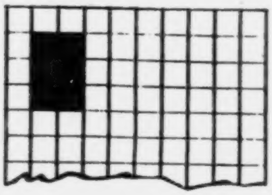
Say, "Why do we use multiplication when we can add?" (Multiplication is a fast way of adding equal groups.)

STRATEGY 2: Distribute to each student a card with a multiplication fact written horizontally, a sheet of graph paper, and a crayon. The facts should be for numbers 1 through 5, e.g, 3 x 2 = 6.

Say, "We will use this graph paper to draw pictures of multiplication facts and then write them horizontally and vertically. Each student has a different multiplication fact." Demonstrate the

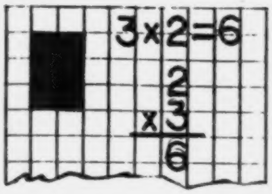
STRATEGY 2: cont'd

procedure by displaying a "drawing" of 3 x 2 = 6.
e.g.,



Say, "Here is a drawing of three times two equals six. It is also called an array. Can you explain this array?" (There are 3 rows with 2 boxes shaded in each row. Therefore there are 3 groups of 2.) Write 3 x 2 = 6 on the graph paper. Say, "I have written 3 x 2 = 6 horizontally. How is it written vertically?" Ask a student to demonstrate, e.g., $\begin{array}{r} 2 \\ \underline{\times 3} \\ 6 \end{array}$.

Say, "Your paper should show an array for the multiplication sentence on your card. It should also show the multiplication fact written both vertically and horizontally."
e.g.,



Ask one student at a time to cover the multiplication facts and to display only his/her array. Ask the other students to write the fact represented by the array, both vertically and horizontally, in their notebooks.

3.04.01.02 **state multiplication facts by filling in the blanks in a multiplication table**

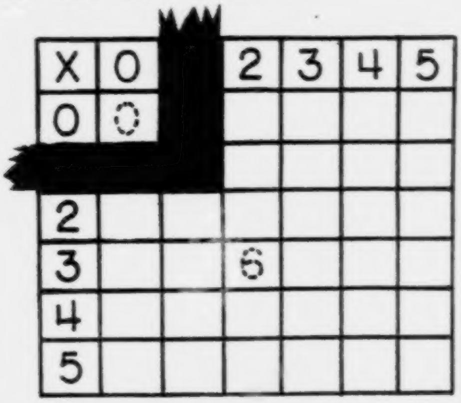
STRATEGY 1: Prepare white chalk, red chalk, and an oaktag reverse L. Draw an incomplete multiplication table on the chalkboard.

STRATEGY 1: e.g.,
cont'd

X	0	1	2	3	4	5
0	0	0	0	0		
1	0					
2	0					
3	0		6			
4	0					
5	0					

Say, "The numbers (factors) across the top are in a row. They are written in white chalk. The numbers down the left side are in a column. They are written in red chalk." Use the reverse L to demonstrate how it can be used to find the factors of the product. Place the reverse L on the multiplication table and demonstrate 0 x 0, 0 x 1, 0 x 2,... Ask a student to write the answer (product) in the box next to the arrow on the reversed L.

e.g.,



Repeat this procedure both across and down until all of the blanks have been filled.

Say, "A multiplication table helps us learn multiplication facts. Just as there are patterns in an addition table, there are patterns in a multiplication table. What patterns do you see?" Accept any reasonable answers.

Hint: The illustrations for this strategy may be used with an opaque projector.

STRATEGY 2: Prepare chalk of two different colors, e.g., green and orange. Display an incomplete multiplication table on the chalkboard. Write the factors across the top using orange chalk and the factors down the left using green chalk. Prepare a set of orange numeral cards (0-5) and a set of green numeral cards. (0-5) Shuffle each set of cards. Place both packs face down on a desk. Ask a student to select one numeral card from each set. Say, "What numeral (factor) is shown on your green card? e.g., 4. ...orange card? e.g., 3. How much are 4 groups of 3?" (4 groups of three = 12.)

Using the multiplication table, follow the green 4 across and the orange 3 down. At what box do they meet? What numeral will you write in that box?" (The numeral 12 will be written in the box.) Replace the cards. Shuffle each pack. Repeat this procedure until all the boxes on the multiplication table have been filled.

3.04.01.03 use the commutative property of multiplication

STRATEGY 1: Prepare and distribute 15 chips (discs, cubes) to each student or group of students. Say, "We have seen many patterns for multiplication facts which make it easier to learn the facts. Today we will learn another strategy for learning and understanding multiplication. Use all your chips to make three equal rows of chips. How many chips will be in each row? (There will be 5 chips in each row.) How many chips are there in all?" (There are 15 chips in all.) Ask a student to write the multiplication sentence that this array shows. (3 x 5 = 15) Say, "Now make 5 rows with your chips. How many chips will be in

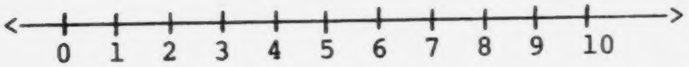
STRATEGY 1: cont'd

each row? (There will be 3 chips in each row.) Is the total number of chips still the same as before?" (There are still 15 chips in all. The total has not changed.) Ask a student to write the multiplication sentence that this array shows. (5 x 3 = 15) Say, "What do you notice about each number sentence?" Elicit that the order of the factors does not change the product. Repeat this procedure using other examples.

STRATEGY 2:

Draw a number line on the chalkboard.

e.g.,



Say, "A rabbit hopped over stones to get home. Starting at zero, he hopped 5 times over 2 stones each time. Where on the number line was the rabbit's home?" (The rabbit's home was at 10.) Ask a student to demonstrate the second rabbit's hops on the number line. Say, "How can we write 5 hops of 2 stones each as a multiplication sentence? (5 hops of 2 stones each can be written as 5 x 2 = 10.) Another rabbit was a very strong hopper. He hopped only 2 times but each hop was across 5 stones. Where was his home?" (His home was at also 10.) Ask a student to demonstrate the second rabbit's hops. Say, "The second rabbit and the first rabbit lived in the same home. Can you write the multiplication sentence for the second rabbit's hops? (2 x 5 = 10) What do you notice about each number sentence?" (The order of the factors does not change the product.) Repeat this procedure using other examples.

P.O. 3.04.01.01

NAME:_______________________________________ CLASS:________ DATE:_______

Connect the horizontal and vertical examples to their products.

Production Line

3 x 4 = ☐

5 x 1 = ☐

0 x 7 = ☐

4 x 5 = ☐

5 x 3 = ☐

⑤

⑫

⑳

⓪

⑮

$$\begin{array}{r} 1 \\ \times 5 \\ \hline \square \end{array}$$

$$\begin{array}{r} 5 \\ \times 4 \\ \hline \square \end{array}$$

$$\begin{array}{r} 4 \\ \times 3 \\ \hline \square \end{array}$$

$$\begin{array}{r} 3 \\ \times 5 \\ \hline \square \end{array}$$

$$\begin{array}{r} 7 \\ \times 0 \\ \hline \square \end{array}$$

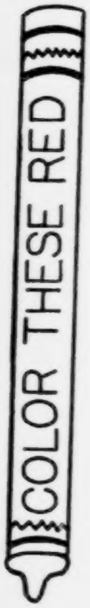
CHALLENGE!

I have 50¢. How much change will I have left if I buy 9 pencils costing 5¢ each? ________

P.O. 3.04.01.02

NAME: ______________________ CLASS: __________ DATE: ________

Cut out the shaded part of the page. Use it to complete the multiplication table.


COLOR THESE RED

X	0	1	2	3	4	5
0						
1				3		
2			4			
3						
4		4				
5						

P.O. 3.04.01.03

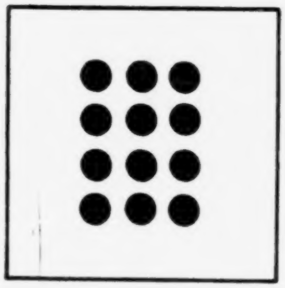
NAME:________________________________ **CLASS:**________ **DATE:**_______

For each example, use the array to fill in the missing information. Turn the page sideways and use the same array to complete the related fact. Then complete the related examples in the last column.

🍎

4 threes

$4 \times 3 \; \boxed{12}$



3 fours

$\boxed{3} \times \boxed{4} = \boxed{12}$

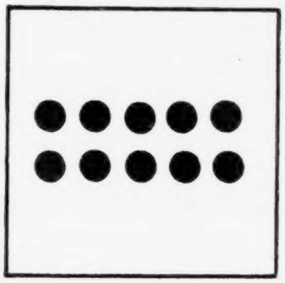
$4 \times 3 = \boxed{12}$

$3 \times 4 = \boxed{12}$

★

☐ fives

$2 \times 5 = $ ☐



☐ twos

$\boxed{5} \times \boxed{2} = $ ☐

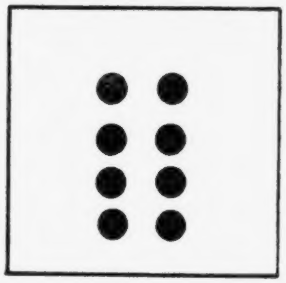
$2 \times 5 = $ ☐

$5 \times 2 = $ ☐

☺

☐ twos

4 × ☐ = ☐



☐ fours

☐ × ☐ = ☐

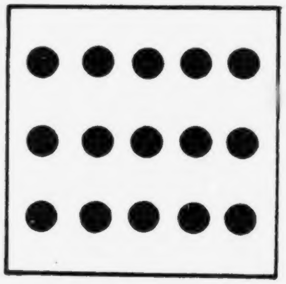
4 × ☐ = ☐

☐ × ☐ = ☐

♥

$\boxed{3}$ ______

☐ × ☐ = ☐



☐ threes

☐ × ☐ = ☐

☐ × ☐ = ☐

☐ × ☐ = ☐

3.05.01 CONCEPTS OF DIVISION

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.05.01.01A demonstrate various ways to write a division example;
e.g.,

$$\begin{array}{r}4\\2\overline{)8}\end{array}\ ; \qquad 8 \div 2 = 4$$

3.05.01.02A name the dividend, the divisor and the quotient;
e.g.,

$$\begin{array}{rc} & \text{quotient}\\ & \downarrow\\ \text{divisor}\rightarrow & \begin{array}{r}5\\4\overline{)20}\end{array}\\ & \uparrow\\ & \text{dividend}\end{array}$$

$$\text{dividend}\longrightarrow 20 \div \underset{\underset{\text{divisor}}{\uparrow}}{4} = 5 \longleftarrow \text{quotient}$$

3.05.01.03A demonstrate that the division process may be regarded as repeated subtraction of the same number;
e.g.,

$$\left.\begin{array}{rl}
2\overline{)\;8} & \\
\underline{-2} & 1\text{ two}\\
6 & \\
\underline{-2} & 1\text{ two}\\
4 & \\
\underline{-2} & 1\text{ two}\\
2 & \\
\underline{-2} & 1\text{ two}\\
0 &
\end{array}\right\}\text{ 4 twos were subtracted}$$

Therefore $\begin{array}{r}4\\ 2\overline{)8}\end{array}$

or $8 \div 2 = 4$.

3.05.01.04A recognize that division and multiplication are inverse operations, that is, that dividing by a number is the inverse operation of multiplying by that number.
e.g.,

$8 \div 2 = 4 \qquad 4 \times 2 = 8$

3.05.01

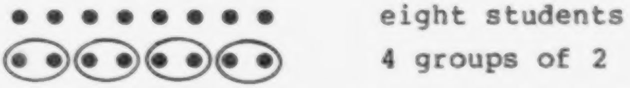
VOCABULARY

TERMS		SYMBOLS
division	quotient	$)\overline{}$
divisor	inverse operation	÷
dividend		

GETTING STARTED 1:

Ask eight students to form groups of two at the front of the classroom. Say, "How many groups of two did you form? (We formed 4 groups of 2 from the 8 students.) How many students were divided into 4 groups of two? (8 students were divided into 4 groups of 2.) What do we call it when we separate or divide one group into several equal groups? (We call it division. What happened when we divided 8 students into groups of 2?" (There were 4 groups of 2.) Demonstrate this on the chalkboard.

e.g.,



Therefore we divided 8 students into 4 groups of 2.

Repeat this procedure using other basic division facts.

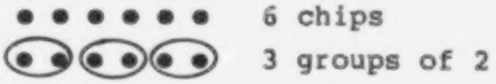
GETTING STARTED 2:

Prepare and distribute 10 chips equally to 5 students. Say, "How many chips does each student have? (Each student has two chips.) Was the total number of chips divided equally among the students? (Yes, they were divided equally.) How do you know the chips were divided equally?" (They were divided equally because each student has an equal number of chips.) Collect the chips from the students. Display 6 chips. Say, "How many groups can we make with two chips in each group?" (With 6 chips we can make 3 groups with 2 chips in each group.) Ask a student to form 3 groups with two chips in each group. Say, "Into how many groups did we divide the 6 chips? (We divided the

GETTING STARTED 2: cont'd

6 chips into 3 groups of 2 chips.) How many chips were in each group? (There were two chips in each group.) Therefore, we divide 6 chips into 3 groups of 2."

e.g.,



Repeat this procedure with other groups of chips to demonstrate basic division facts.

3.05.01

3.05.01.01 **demonstrate various ways to write a division example**

STRATEGY 1: Prepare and display a group of chips containing 8 blue chips and 8 red chips. Ask a student to take the 8 red chips and divide them into groups of 4. Say, "How many groups of 4 did you make?" (I made 2 groups of 4 from the 8 red chips.) On the chalkboard write 8 ÷ 4 = 2.

Ask another student to take the 8 blue chips and divide them into 2 equal groups. Say, "How many chips will be in each group? (There will be 4 chips in each group.) On the chalkboard write $\begin{array}{r}2\\4\overline{)8}\end{array}$. Say, "Although the questions were different, the examples are the same." Write the following examples on the chalkboard:

$8 \div 4 = 2$ $\qquad$ $\begin{array}{r}2\\4\overline{)8}\end{array}$

Say, "How do we read the examples on the chalkboard? (Eight divided by four equals two.) We read both examples the same way; eight divided by four equals two." On the chalkboard write, eight divided by four equals two.

Repeat this procedure using other division fact examples. Ask several students to write both forms of an example on the chalkboard as the other students write both forms in the their notebooks and read them aloud.

3.05.01.02 **name the dividend, the divisor, and quotient**

STRATEGY 1: Prepare and display oaktag cards backed with tape and labeled **Dividend, Divisor, Quotient.** Say, "What do we call the numbers we add in an addition example? (The numbers we add are called addends.) What is the total called? (The total is called the sum.) Today we will name the parts of a division example."

STRATEGY 1: cont'd

Say, "Manny divided 8 apples into 2 equal groups. How many apples were in each group?" (There were 4 apples in each group.) Ask a student to write a division example for this problem on the chalkboard. e.g.,

$$8 \div 2 = 4 \quad ; \quad \begin{array}{r} 4 \\ 2\overline{)8} \end{array}$$

Say, "Each number in a division example has a name. In $8 \div 2 = 4$, the eight is the dividend. What does the dividend tell us?" (The dividend is the number of items to be divided.) Place the dividend card under the 8. Say, "The 2 is the divisor. What does the divisor tell us?" (The divisor is the number of groups into which the 8 is divided or it is the number of items in each group.) Place the divisor card under the 2. Say, "The 4 is the quotient. What does the quotient tell us?" (The quotient is the answer. It tell us the number in each group or the number of groups.) Place the quotient card under the 4.

e.g.,

8	÷	2	=	4
Dividend		Divisor		Quotient

On the chalkboard write the definition for each term. Ask the students to write the definitions in their notebooks. Repeat this procedure for $2\overline{)10}$.

Say, "If Alex divides 10 lollipops into groups of 2, how many groups of 2 are there?" (There are 5 groups of 2.) Ask a student to write division examples for this problem on the chalkboard and to use the oaktag cards to identify the dividend, divisor, and quotient, e.g., $10 \div 2 = 5$, $\begin{array}{r} 5 \\ 2\overline{)10} \end{array}$. Repeat this procedure with other division examples, some asking for division into equal groups and others asking for the number that will be in each group. Ask the students to copy the examples into their notebooks.

STRATEGY 1: cont'd

Say, "Why do we name each part of an example?" (We name each part of an example to make it easier to identify the parts and to be able to discuss the example.)

3.05.01.03 **demonstrate that the division process may be regarded as repeated subtraction of the same number**

STRATEGY 1: Display a group of 6 blocks. Write the number 6 on the chalkboard. Ask a student to remove 2 blocks. Say, "How many blocks were removed? (Two blocks were removed.) How many blocks are left?" (4 blocks are left.) On the chalkboard write the partially solved division algorithm as the students write it in their notebooks.

e.g.,

$$\begin{array}{rl} 2\overline{)6} & \\ \underline{-2} & \text{1 group of 2 blocks were subtracted} \\ 4 & \end{array}$$

Continue removing the blocks 2 at a time, until no blocks are left. Each time 2 blocks are removed ask a student to identify the number of blocks left and to write the representative subtraction number sentences on the chalkboard as the students write it in their notebooks.

e.g.,

$$\begin{array}{r} \overset{3}{2\overline{)6}} \end{array}$$
$$\left.\begin{array}{rl} \underline{-2} & \text{1 group of two blocks were subtracted} \\ 4 & \\ \underline{-2} & \text{1 group of two blocks were subtracted} \\ 2 & \\ \underline{-2} & \text{1 group of two blocks were subtracted} \\ 0 & \end{array}\right\} \begin{array}{l} \text{3 groups} \\ \text{of 2 blocks} \\ \text{were} \\ \text{subtracted} \end{array}$$

Say, "How many times did we remove 2 blocks?" (We removed 2 blocks 3 times.) On the chalkboard write 6 ÷ 2 = 3 and $\overset{3}{2\overline{)6}}$. Say, "What does the six represent

STRATEGY 1: cont'd

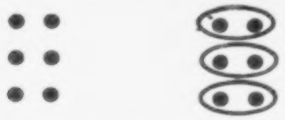
in this example?...the two?...the three?" (The dividend, 6, represents the total number of blocks to be divided. The divisor, 2, represents the number of groups subtracted and the quotient, 3, represents the number of times that 2 blocks were removed from the 6 blocks).

Repeat this procedure with other division facts.

3.05.01.04 **recognize that division and multiplication are inverse operations; that is, that dividing by a number is the inverse operation of multiplying by that number**

STRATEGY 1: Say, "Mr. Multiplication and Mr. Division are good friends. Mr. Division planted six trees. He divided the trees into two rows with three trees in each row." Ask a student to write a division sentence for the problem on the chalkboard, e.g., 6 ÷ 2 = 3. Ask another student to draw an array for the problem.

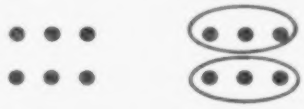
e.g.,



$6 \div 2 = 3$, $\begin{array}{r} 3 \\ 2\overline{)6} \end{array}$

Say, "Mr. Multiplication helped Mr. Division by showing him that he was correct. He said, 'If Mr. Division planted two rows with three trees in each row he would still have six trees.'" Ask a student to write a multiplication sentence for the problem on the chalkboard, e.g., 2 x 3 = 6. Ask another student to draw an array to represent the multiplication sentence.

e.g.,



$2 \times 3 = 6$

Say, "What do you notice about the arrays for 6 ÷ 2 = 3 and 2 x 3 = 6? (They are the same.) What

STRATEGY 1: cont'd

can you tell us about the numbers in each number sentence? (The numbers are the same in each number sentence.) How are the number sentences different? (One is a multiplication sentence and the other is a sentence. Division starts with a whole and separates it into equal parts. Multiplication takes the parts and puts them together to get the whole.) We can say that multiplication and division are inverse operations. The same numbers can be used to create related division and multiplication examples."

Repeat this procedure using other examples to show the inverse relationship of multiplication and division.

STRATEGY 2:

Prepare and distribute 1 large sheet of paper to each student. Say, "How do we check an addition example?" (We check an addition example with subtraction or by reversing the addends.)

e.g.,

$$\begin{array}{r} 3 \\ +\ 5 \\ \hline 8 \end{array} \qquad \overline{\underline{\text{check}}} \quad \begin{array}{r} 5 \\ +\ 3 \\ \hline 8 \end{array} \quad \text{or} \quad \begin{array}{r} 8 \\ -\ 5 \\ \hline 3 \end{array}$$

Say, "How do we check a subtraction example?" (We check a subtraction example by adding the difference and the subtrahend to see if that sum matches the minuend.)

e.g.,

$$\begin{array}{r} 8 \\ -\ 2 \\ \hline 8 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 6 \\ +\ 2 \\ \hline 8 \end{array}$$

Say, "Addition and subtraction are related operations. They are opposite or inverse. How do you think we can check a division example? (We can check a division example by multiplying.) Let's see if you are correct. Fold your paper in half and write the

STRATEGY 2: cont'd

headings, Division and Multiplication at the top of each half. Write 6 ÷ 3 = 2 under the Division heading. Draw 6 circles. Divide the circles into groups of 3. How may this be written? (6 ÷ 3) What is the result?" (6 ÷ 3 = 2.)

e.g.,

Division	Multiplication
6 ÷ 3 = 2	
or	
$\begin{array}{r}2\\3\overline{)6}\end{array}$	
● ● ●	
● ● ●	

Say, "How many groups of 3 did you make?" (From 6 we made 2 groups of 3.)

Write 2 x 3 = 6 under the Multiplication heading and draw 2 rows of circles, each containing 3 circles."

e.g.,

Division	Multiplication
6 ÷ 3 = 2	2 x 3 = 6
or	● ● ●
$\begin{array}{r}2\\3\overline{)6}\end{array}$	● ● ●
● ● ●	
● ● ●	

Say, "How many groups did you make? (We made two groups). How many are in each group? (There are three in each group). How many are there in all? (There are six in all. Therefore, 2 groups of 3 is the same as 6.) How are these examples the same? The numbers 2, 3, and 6 are the same). How are they different?" (In division, we divide the whole into equal parts. In multiplication, we put equal parts together to make the whole.)

P.O. 3.05.01.01

NAME:____ CLASS:__________ DATE:_______

Solve the examples. Draw an X on the example in each row which is not related to that row.

$6 \div 2 = \square$	$\begin{array}{r}\square\\ 2\,\overline{)\,6}\end{array}$	$\begin{array}{r}\square\\ 4\,\overline{)\,8}\end{array}$
$\begin{array}{r}\square\\ 4\,\overline{)\,12}\end{array}$	$12 \div 4 = \square$	$\begin{array}{r}\square\\ 4\,\overline{)\,16}\end{array}$
$\begin{array}{r}\square\\ 5\,\overline{)\,25}\end{array}$	$20 \div 5 = \square$	$\begin{array}{r}\square\\ 5\,\overline{)\,20}\end{array}$
$8 \div 4 = \square$	$9 \div 3 = \square$	$\begin{array}{r}\square\\ 3\,\overline{)\,9}\end{array}$

Write and solve 2 division examples for each problem.

Bob has 8 peaches. He will share them with 4 friends. How many peaches will each friend get?	Sarah has 12 pennies. She will give an equal number to 3 friends. How many pennies will each friend get?

Do you remember?

If it is 10:40, it is 20 minutes to 11.

If it is 2:55, it is ______ minutes to ______.

If it is 12:35, it is ______ minutes to ______.

If it is 1:58, it is ______ minutes to ______.

A.M. or P.M.?

Breakfast A.M. Bed Time_________ Homework___________

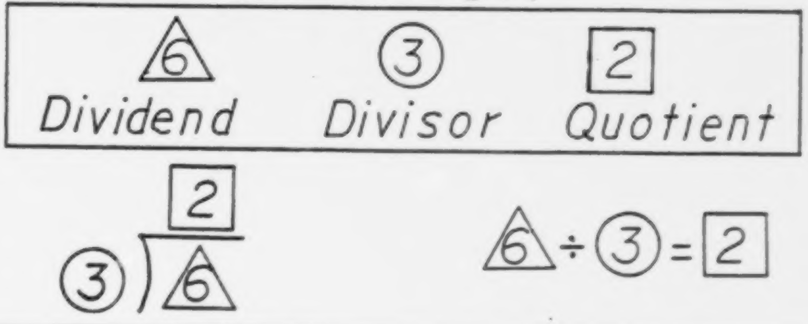
Wake Up_________ Dinner Time______ Leave School_______

P.O. 3.05.01.02

NAME: ____________________ **CLASS:** ________ **DATE:** ________

Follow the directions below.

DIVISION



Write the number for each term.

$15 \div 3 = 5$

5 is the quotient.

$\begin{array}{r} 3 \\ 4\overline{)12} \end{array}$

____ is the quotient.

$\begin{array}{r} 4 \\ 2\overline{)8} \end{array}$

____ is the divisor.

$20 \div 5 = 4$

____ is the dividend.

$\begin{array}{r} 3 \\ 2\overline{)6} \end{array}$

____ is the divisor.

$10 \div 5 = 2$

____ is the quotient.

Write the term that identifies the number.

$\begin{array}{r} 5 \\ 2\overline{)10} \end{array}$

10 is the dividend.

$8 \div 4 = 2$

2 is the ____________________.

$12 \div 3 = 4$

3 is the ____________________.

$\begin{array}{r} 3 \\ 5\overline{)15} \end{array}$

3 is the ____________________.

P.O. 3.05.01.03

NAME: ______________________ CLASS: ________ DATE: ________

Complete the division examples below.

2) 6
-2 1 two was subtracted
4
-2 1 two was subtracted
2
-2 1 two was subtracted
0

3 twos were subtracted.

6 ÷ 2 = 3

3) 6
-3 1 three was subtracted
3
-3 1 three was subtracted
0

____ threes were subtracted.

6 ÷ 3 = ☐

5) 15
- 5 1 five was subtracted
10
-☐ ______________
5
-☐ ______________
☐

____ fives were subtracted.

☐ ÷ ☐ = ☐

2) 8
-2 ______________
☐
-☐ ______________
☐
-☐ ______________
☐
-☐ ______________
☐

____ ____ were subtracted.

☐ ÷ ☐ = ☐

CHALLENGE!

Bob bought 3 red balloons, 4 yellow balloons, and 8 green balloons. He will share them equally with 2 friends. How many balloons will Bob and each of his friends have? ______

P.O. 3.05.01.04

NAME: ______________________________ CLASS: __________ DATE: ________

Complete each example by filling in the missing numeral.

$8 \div 2 = \boxed{4}$	$\boxed{4} \times 2 = 8$
$10 \div 2 = \boxed{}$	$\boxed{} \times 2 = 10$
$9 \div 3 = \boxed{}$	$3 \times \boxed{} = 9$
$15 \div 3 = \boxed{}$	$\boxed{} \times 3 = 15$
$12 \div 3 = \boxed{}$	$\boxed{} \times 3 = 12$
$12 \div 4 = \boxed{}$	$3 \times 4 = \boxed{}$
$25 \div 5 = \boxed{}$	$\boxed{} \times 5 = 25$
$14 \div 2 = \boxed{}$	$7 \times 2 = \boxed{}$

Do you remember?

Round these numbers to the nearest 100.

356

629 rounds to _____

160 rounds to _____
309 rounds to _____
74 rounds to _____
478 rounds to _____

937 rounds to _____
571 rounds to _____
770 rounds to _____

SHARPENING YOUR SKILLS

Units 12, 13

Name: ______________________ **Class:** __________ **Date:** __________

1. Which number will make both examples true?

$\begin{array}{r} 2 \\ \times 5 \\ \hline \square \end{array}$ $5 \times 2 = \square$

ⓐ 3 ⓑ 7 ⓒ 10 ⓓ 14

2. Write the product for each example.

$3 \times 2 = \square$ $4 \times 3 = \square$

$1 \times 5 = \square$ $2 \times 4 = \square$

3. Use the multiplication table to find the hidden products.

X	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2	4	■	8	10
3	0	▲	6	9	12	☺
4	0	4	8	12	16	20
5	0	5	10	15	20	🎈

■ = ☐ ▲ = ☐

🎈 = ☐ ☺ = ☐

4. If $4 \times 2 = 8$, then $\square \times 4 = 8$.

ⓐ 2 ⓑ 4 ⓒ 6 ⓓ 14

5. Which example shows how many twos there are in twelve?

ⓐ $12 \div 2 = 6$ ⓒ $6 + 6 = 12$

ⓑ $6 \times 2 = 12$ ⓓ $\square + 5 = 12$

6. In $20 \div 5 = 4$, the 4 is called the ________.

ⓐ divisor ⓒ quotient

ⓑ dividend ⓓ product

7. Look at the division example.

$$\begin{array}{rl} 4\overline{)12} & \\ -4 & \text{1 four was subtracted} \\ \hline 8 & \\ -4 & \text{1 four was subtracted} \\ \hline 4 & \\ -4 & \text{1 four was subtracted} \\ \hline 0 & \end{array}$$

This shows that there are ______ fours in 12.

8. Complete the chart by writing the inverse number facts.

$12 \div 3 = 4$	
$8 \div 4 = 2$	
$6 \div 2 = 3$	

9. Which three numerals can make a multiplication and a division fact?

ⓐ 3, 4, 5 ⓒ 2, 4, 6

ⓑ 2, 5, 10 ⓓ 3, 4, 7

3.04.02 THE IDENTITY ELEMENT (1) FOR MULTIPLICATION AND THE ROLE OF ZERO

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.04.02.01A	recognize one (1) as the identity element in multiplication; e.g., 3 x 1 = 3 1 x 3 = 3 5 x 1 = 5 1 x 5 = 5
3.04.02.02A	find the product when zero (0) is a factor. e.g., 2 x 0 = 0 0 x 2 = 0 4 x 0 = 0 0 x 4 = 0

3.04.02

VOCABULARY

TERMS

zero
identity element
factor
product

GETTING STARTED 1:

Prepare five paper plates and a box of cookies or discs. Display three empty plates. Say, "How many plates do you see?" (There are three plates.) Place one cookie on each plate. Say, "How many cookies did I put on each plate? (One cookie was placed on each plate.) How many cookies did I use in all?" (Three cookies were used.) Empty the plates. Repeat this procedure placing one cookie on each of one, two, four, and five plates.

Say, "If we place one cookie on each plate, there will always be the same number of cookies as plates?"

GETTING STARTED 2:

Prepare and display a multiplication table.

e.g.,

X	0	1	2	3	4	5
0						
1						
2						
3						
4						
5						

Say, "Do you remember how to show 2 times 2 on the multiplication grid?" Ask a student to write the product on the grid and say the answer in a sentence, e.g., 2 x 2 = 4. Ask another student to write the answer for 2 x 3 on the grid and say the answer in a complete sentence. Continue this procedure until all the spaces on the grid are filled.

3.04.02

3.04.02.01 **recognize one (1) as the identity element in multiplication**

STRATEGY 1: Prepare 10 paper plates and a box of cookies or discs. Display three empty plates. Say, "How many plates do you see?" (There are three plates.) Place one cookie on each plate. Say, "How many cookies are on each plate? (There is 1 cookie on each plate.) How many cookies are there in all? (There are 3 cookies in all.) What multiplication sentence represents three plates with one cookie on each plate?" Elicit and write 3 x 1 = 3. Say, "The numbers we multiply are called factors. The answer in multiplication is called the product. What are the factors in the multiplication sentence, 3 x 1 = 3? What is the product?" (The factors are 3 and 1. The product is 3.)

Repeat this procedure using one through ten plates, always placing one cookie on each plate.

Say, "What is the product when any number is multiplied by a factor of 1? (The product is the same as the other factor.) The number one is called the identity element for multiplication. It keeps the identity of the original number when 1 is multiplied by the number." Ask the students to write the following sentence in their notebooks: The product of any number multipled by a factor of 1 equals that number.

STRATEGY 2: Refer to the multiplication table in Getting Started 2. Say, "Look at the products with one as a factor. Let's list the number sentences which have one as a factor."

STRATEGY 2: cont'd

e.g.,

1 x 0 = 0 or 0 x 1 = 0
1 x 1 = 1 or 1 x 1 = 1
1 x 2 - 2 or 2 x 1 = 2
1 x 3 = 3 or 3 x 1 = 3
.
.
.

Say, "Do you see a pattern? (The product in all the number sentences is the same as one of the factors in that number sentence.) Can we predict the products of any number times one? (The product of any number times one is the same as the factor which is not one.) What is 100 times 1?" (100 x 1 = 100.) Ask the students to create other number sentences with one as a factor.

3.04.02.02 find the product when zero (0) is a factor

STRATEGY 1: Prepare a set of large, blank index cards. Display two cards. Say, "How many cards am I holding? (There are 2 cards.) How many butterflies are on these cards? (There are no (0) butterflies on the cards.) How many butterflies are there all together? (There are 0 butterflies altogether.) What number sentence represents two cards with no (0) butterflies on them?" Elicit and write 2 x 0 = 0. Say, "What is the product when a number is multiplied by zero?" (When a number is multiplied by zero, the product is always zero.)

Repeat this procedure through ten blank cards. Ask the students to write each example in their notebooks under the heading Finding the Product When Zero is a Factor.

STRATEGY 2: Prepare and display five paper cups with 4 chips in each cup. Say, "How many cups are there? (There are 5 cups.) How many chips are in each cup? (There are 4 chips in each cup.) How many chips are there altogether?" (There are 20 chips altogether.) On the chalkboard write the number sentence, 5 x 4 = 20. Remove one chip from each cup. Say, "How many cups are there? (There are 5 cups.) How many chips are in each cup? (There are 3 chips in each cup.) How many chips are there altogether?" (There are 15 chips all together.) On the chalkboard write the number sentence, 5 x 3 = 15. Repeat this procedure using two chips, then one chip in each cup. Display 5 empty cups and say, "How many cups are there? (There are 5 cups.) How many chips in are each cup? (There are 0 chips in each cup.) How many chips are there altogether?" (There are 0 chips altogether.) What number sentence represents 5 cups with 0 chips in each?" Elicit and write the number sentence, 5 x 0 = 0.

Repeat this procedure using four empty cups ...three ...two ...one empty cup. Say, "What is the product when multiplying by zero?" (When multiplying by zero, the product is always zero.)

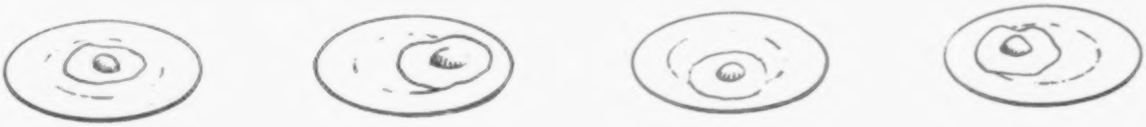
Refer to the multiplication table in Getting Started 2. Ask the students to find a pattern where zero is a factor, to predict the product of any number with zero as a factor, and to create examples with zero as a factor.

P.O. 3.04.02.01,.02

NAME: ________________ CLASS: ________ DATE: ________

Follow the directions below.

RULE: The product of any number multiplied by a factor of 1 equals that number.



There are 4 dishes. There is 1 egg on each dish. Circle the multiplication sentence that describes the story.

4 x 0 = 4 4 x 1 = 4 4 x 4 = 4

Complete each number sentence.

5 x 1 = ☐ 1 x 1 = ☐

7 x 1 = ☐ 1 x 25 = ☐

1 x 10 = ☐ 15 x 1 = ☐

RULE: When any number is multiplied by 0, the product is always 0.

Complete each number sentence.

3 x 0 = ☐ 25 x 0 = ☐

1 x 0 = ☐ 0 x 10 = ☐

0 x 8 = ☐ 19 x 0 = ☐

There are 5 empty cookie jars.
How many cookies are there in all? ____________

3.06.01 EQUIVALENT FRACTIONS

(3-4 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.06.01.01A identify and define the numerator and denominator in a given fraction;

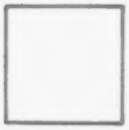
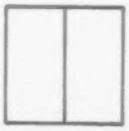
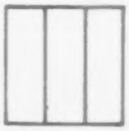
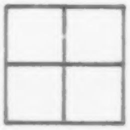
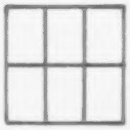
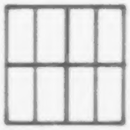
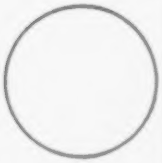
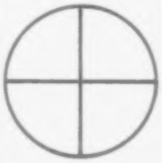
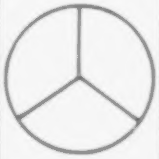
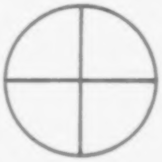
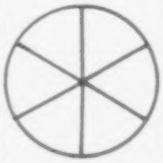
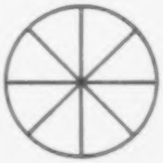
e.g.,

$$\begin{array}{l} 2 \leftarrow \text{numerator} \\ \overline{3} \leftarrow \text{denominator} \end{array}$$

*3.06.01.02A identify and record the total number of parts to equal one whole (halves, thirds, fourths, sixths, and eighths);

e.g.,

NUMBER OF PARTS FOR...

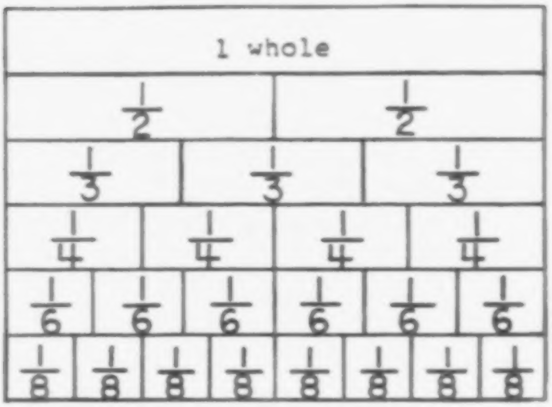
Unit	Halves	Thirds	Fourths	Sixths	Eighths
					
					
	2 halves =1 $\frac{2}{2} = 1$	3 thirds =1 $\frac{3}{3} = 1$	4 fourths =1 $\frac{4}{4} = 1$	6 sixths =1 $\frac{6}{6} = 1$	8 eighths =1 $\frac{8}{8} = 1$

3.06.01.03A compare and order like fractions;
e.g.,

$$\frac{2}{8}, \frac{5}{8}$$

$$\frac{5}{8} > \frac{2}{8}$$

3.06.01.04A compare and order unlike unit fractions.
e.g.,


1 whole
1/2 1/2
1/3 1/3 1/3
1/4 1/4 1/4 1/4
1/6 1/6 1/6 1/6 1/6 1/6
1/8 1/8 1/8 1/8 1/8 1/8 1/8 1/8

$$\frac{1}{8}, \frac{1}{6}$$

$$\frac{1}{8} < \frac{1}{6}$$

3.06.01

VOCABULARY

TERMS

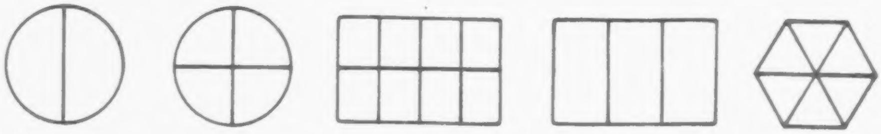
denominator
numerator
fraction
greater than
less than
like fractions
unlike fractions
halves
thirds
fourths
sixths
eighths

SYMBOLS

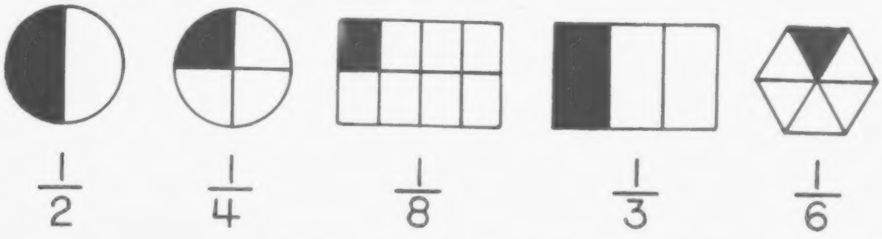
>
<

GETTING STARTED 1:

Ask the students to name the parts of a clock and list them on the chalkboard. (The parts of a clock are the minute hand, second hand, face, and numbers.) Say, "We need all these parts to have a complete clock. What are the parts of a book? (A book has a cover, pages, binding, a table of contents, an index, and a glossary.) We need all the parts to have a complete book." Prepare and display circles, rectangles and hexagons divided into congruent parts.
e.g.,



Say, "How many parts make up each shape?" (The answers will vary.) Ask a student to shade one part of each shape. Write the fraction below each shape which describes the number of parts shaded compared to the total number of parts in the whole.
e.g.,



Say, "To make a complete figure, all the parts are needed."

Repeat this procedure using other examples to show that all the parts are needed to make a whole item.

GETTING STARTED 2:

Distribute a piece of paper and scissors to each student. Ask the students to cut the paper into several parts without specifying the number of parts. Say, "To make one whole piece of paper, you must put the parts back together. It does not matter if it is cut into two parts or into eight parts. All the pieces are needed to have a whole paper." Ask the students to put the parts together to reconstruct the paper. Say, "Would all the pieces be equal to the whole paper if they would be arranged differently?" (Yes, all the pieces would equal the whole paper regardless of how they are arranged.)

3.06.01

3.06.01.01 **identify and define the numerator and denominator in a given fraction**

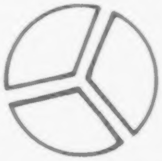
STRATEGY 1: Prepare a flannelboard and flannel-backed fractional parts. Write $\frac{2}{3}$ on the chalkboard. Ask a student to read the fraction. Label the numerator and the denominator.

e.g.,

$$\frac{2}{3} \quad \frac{\text{numerator}}{\text{denominator}}$$

Say, "The bottom number is called the denominator. What does the denominator tell us? (The denominator shows the total number of equal parts that make up the whole.) How many equal parts would make up this whole? (There are 3 equal parts to this whole.) The top number is called the numerator. What does the numerator tell us? (The numerator shows the number of parts we are talking about.) How many parts are we talking about?" (We are talking about 2 parts.) Display $\frac{3}{3}$ in flannelboard pieces.

e.g.,



Hold two of the pieces. Say, "I am holding two of the three pieces or two-thirds of the pieces. How can you show that each part of the whole is the same as the others?" (Compare the parts by placing one on top of the other.)

Repeat this procedure by displaying other fractions with denominators of 2, 4, 6, or 8 on the flannelboard. Ask the students to write the appropriate fraction and to identify the numerators and the denominators.

STRATEGY 2: Say, "Before cutting a pizza you would want to know how many equal slices are needed. Can you explain that another way? (Yes, if there are eight people at a party and they want to share the pizza equally, eight parts are needed.) A pizza was cut into eight equal slices. Adam ate three slices. How much of the pie did he eat?" (Adam ate $\frac{3}{8}$ of the pie.) Write the following on the chalkboard:

$$\frac{3}{8}\quad\frac{\text{numerator}}{\text{denominator}}$$

Say, "The bottom number is the denominator. What does the denominator tell us? (The denominator tells how many equal slices the pizza had.) The top number is the numerator. What does the numerator tell us? (It tells how many pieces Adam ate.) How many pieces did Adam eat? (He ate 3 pieces.) What part of the pizza did he eat?" (He ate $\frac{3}{8}$ of the pizza.) Repeat this procedure using other examples.

3.06.01.02 **identify and record the total number of parts to equal one whole (halves, thirds, fourths, sixths and eighths)**

STRATEGY 1: Prepare a flannelboard and flannel-backed fractional parts. Display a whole circle and two halves of a circle. Say, "What shape is this? (The shape is a circle.) Into how many equal parts has the circle been cut? (The circle has been cut into 2 equal parts.) What is each part called? (Each part is called one-half.) How many halves make a whole circle?" (Two halves make a whole circle.) Continue this procedure for thirds, fourths, sixths and eighths. Say, "How many people could share a pie cut into halves? ...thirds? ...fourths? ...sixths?

STRATEGY 1: cont'd

...eighths? (Two students could share a pie cut into halves...) How can a fraction explain this?" (The fraction $\frac{2}{2}$ shows a 2 in the numerator which tells the number of parts we are talking about. The 2 in the denominator shows the number of parts into which the whole was cut. Elicit a similar explanation for thirds, fourths, sixths and eighths.

STRATEGY 2:

Prepare six apples. Cut one apple into two equal parts. Say, "Into how many parts has this apple been cut? (This apple has been cut into 2 equal parts.) What do we call each part?" (Each part is called one-half.) Write one-half on the chalkboard. Say, "How many halves are needed to make a whole apple?" (One whole apple is equal to two halves.) Write two halves = 1 on the chalkboard.

Repeat this procedure cutting the other apples into thirds, fourths, sixths and eighths and recording three thirds = 1, four fourths = 1, six sixths = 1, and eight eighths = 1 on the chalkboard.

Say, "There are 2 apples on a table. One is cut into 4 equal pieces. The other is cut into 2 equal pieces. Two students will share one whole apple. Each student will get 1 piece. Which apple did they share? (They will share the apple cut into 2 equal pieces.) What is each piece called? (Each piece is called one-half an apple.) How many halves are in one whole apple?" (There are two halves in one whole apple.) On the chalkboard write 2 halves = 1. Repeat this procedure with the other apples. Say, "How do we know how many parts equal the whole?" (We can look at the denominator. It tells us how many parts are in the whole.)

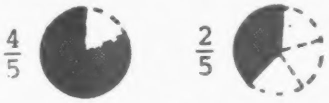
3.06.01

3.06.01.03 **compare and order like fractions**

STRATEGY 1: Prepare a flannelboard and fractional pieces for halves, thirds, fourths, sixths, and eighths.

Say, "We have seen how fractions with different denominators and different numerators can be equal, e.g., $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$. Now we will compare fractions which have different numerators but the same denominators." Write two fractions with like denominators on the chalkboard, e.g., $\frac{4}{5}$ $\frac{2}{5}$. Ask a student to choose flannel pieces which match each fraction and to display them on the flannelboard.

e.g.,



Say, "Which group of pieces is greater?" (Four fifths is greater than two fifths.) Ask the students to relate this to the meaning of numerator and denominator to verify the conclusion that $\frac{4}{5}$ is greater than $\frac{2}{5}$.

Repeat this procedure using other fractions and their representative pieces. Say, "Is there a pattern in the fractional comparisons? (In fractions with like denominators the larger numerator has the greater value.) Is there a symbol we can use to show which fraction is larger or smaller than another fraction?" (This can be shown with a greater than or less than symbol.) Ask the students to write the symbols on the chalkboard. Say, "How are these symbols used?" (The point of the symbol always points to the smaller fraction. The open end is always open towards the larger fraction.) Ask a student to demonstrate by placing the correct symbol, < or >, between $\frac{4}{5}$ and $\frac{2}{5}$ and between $\frac{1}{6}$ and $\frac{5}{6}$, e.g., $\frac{4}{5} > \frac{2}{5}$, $\frac{1}{6} < \frac{5}{6}$.

Ask the students to write and to read these statements.

Four fifths is greater than two fifths.
One sixth is less than five sixths.

STRATEGY 1: cont'd

Write several like fractions on the chalkboard, e.g., $\frac{7}{8}$, $\frac{2}{8}$, $\frac{4}{8}$. Ask a student to rewrite these fractions in order, from the smallest to the largest, ($\frac{2}{8}$, $\frac{4}{8}$, $\frac{7}{8}$) and to compare any pair using the < or > symbols as the other students write them in their notebooks.

Repeat this procedure with other series of like fractions.

STRATEGY 2:

Prepare and display interlocking cubes and a set of flash cards. Each flash card should show two fractions with like denominators.

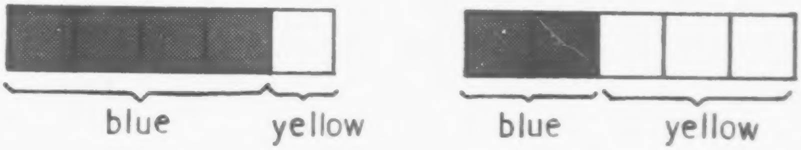
e.g.,

$\boxed{\frac{4}{5} \qquad \frac{2}{5}}$

Say, "What does the denominator, the bottom number of a fraction, tell us? (The denominator tells us the number of parts into which the whole has been broken.) What does the numerator, the top number, tell us?" (The numerator tells us the number of parts we are talking about.)

Draw a representation of $\frac{4}{5}$ and a representation of $\frac{2}{5}$ on the chalkboard.

e.g.,



Ask the students to use interlocking cubes to model $\frac{4}{5}$ and $\frac{2}{5}$. Say, "Which is larger? ($\frac{4}{5}$ is larger than $\frac{2}{5}$.) How do you know?" (If fractions have the same denominator and different numerators, the larger fraction is the one that has the larger numerator.) Ask a student to write the symbol > on the chalkboard. Say, "How do we read this symbol? (The

STRATEGY 2: cont'd

point of this symbol always points to the smaller fraction and the open end always opens toward the larger fraction.) If we think of this symbol as the mouth of the Cookie Monster, his mouth is always open to the greater number."

Display a flash card with two fractions having like denominators. Say, "Write these two fractions in your notebook. Place a greater than or less than symbol between the fractions." Ask a student to read the statement for the pair of fractions, e.g., $\frac{4}{5}$ is greater than $\frac{2}{5}$.

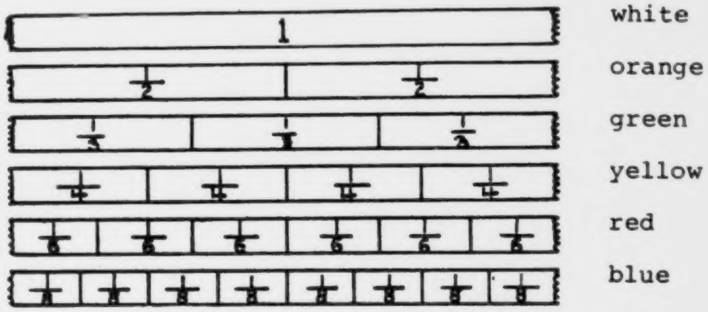
Repeat this procedure until all the flash cards have been used.

3.06.01.04 **compare and order unlike unit fractions**

STRATEGY 1: Prepare six equal strips of adding machine tape and a set of crayons or markers to develop a chart. Tape a strip at the top of the chart to represent one whole. Say, "I will use another strip of tape equal in size to the first strip, fold it into 2 equal parts, and color one part orange. What part is colored orange?" (One-half is colored orange.)

Repeat this procedure until all the strips, representing thirds, fourths, sixths and eighths are in place. Use a different color for each fraction.

e.g.,



Say, "Look at the strips. Which fraction is largest? ... smallest? (One-half is the largest fraction

STRATEGY 1:
cont'd

shown. One-eighth is the smallest...) Ask a student to write the colors of the fractions across the chalkboard from the largest to the smallest.

e.g.

white orange green yellow red blue

Ask several students to identify the unit fraction associated with each color and to write it under the appropriate color as the other students write it in their notebooks.

e.g.,

white	orange	green	yellow	red	blue
1	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$

Say, "What do you notice about the denominators of these unit fractions? (As the fractions get smaller, the denominators get larger.) Can you explain why this happens?" (One-half represents 2 equal parts of a whole. One-eighth represents 8 equal parts of a whole. The greater the number of parts, the smaller each part will be.)

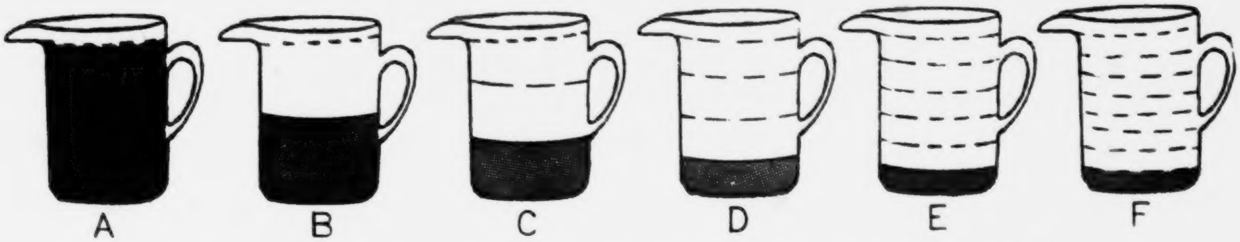
Write the following statement on the chalkboard:

> As unit fractions get smaller, the denominators get larger. The greater the number of parts into which the whole has been divided, the larger the denominators will be.

Ask the students to copy the above statement into their notebooks.

STRATEGY 2: Prepare and display pictures of pitchers which are equal in size but are calibrated differently.

e.g.,



Say, "We have used the greater than and less than symbols to compare like fractions. What are like fractions? (Like fractions are fractions which have the same denominators.) We will compare unlike fractions. What do you think unlike fractions mean?" (Unlike fractions are fractions which have different denominators.)

Say, "Each pitcher has markings to show how much liquid it contains. How full is pitcher B? (Pitcher B is one-half full.) ..C? (... one-third full.) ...D? (... one-fourth full.) ...E? (... one-sixth full.) ...F?" (... one-eighth full.) Point to pitchers B and D. Say, "Part of each pitcher has been filled. Let's compare the levels of liquid in these pitchers. Which pitcher has more?...less? (Pitcher B has more. Pitcher D has less.) Say, "Do you see a pattern?" (Yes, the larger fraction has a smaller denominator.) Write on the chalkboard, $\frac{1}{2} > \frac{1}{4}$ or $\frac{1}{4} < \frac{1}{2}$.

Ask the students to record the comparisons in their notebooks.

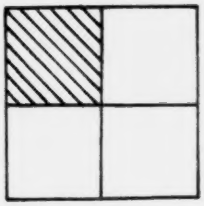
Repeat this procedure comparing the levels of liquid in other pitchers as the students record each comparison.

Say, "Fractions with numerators of 1 are called unit fractions. How can we compare unit fractions?" (We look at the denominators. The larger the denominator, the smaller the fraction.)

P.O. 3.06.01.01

NAME:________________________________ **CLASS:**__________ **DATE:**________

Follow the directions in each part.



One-fourth ($\frac{1}{4}$) of this square is shaded.

The numerator 1 is the shaded part.

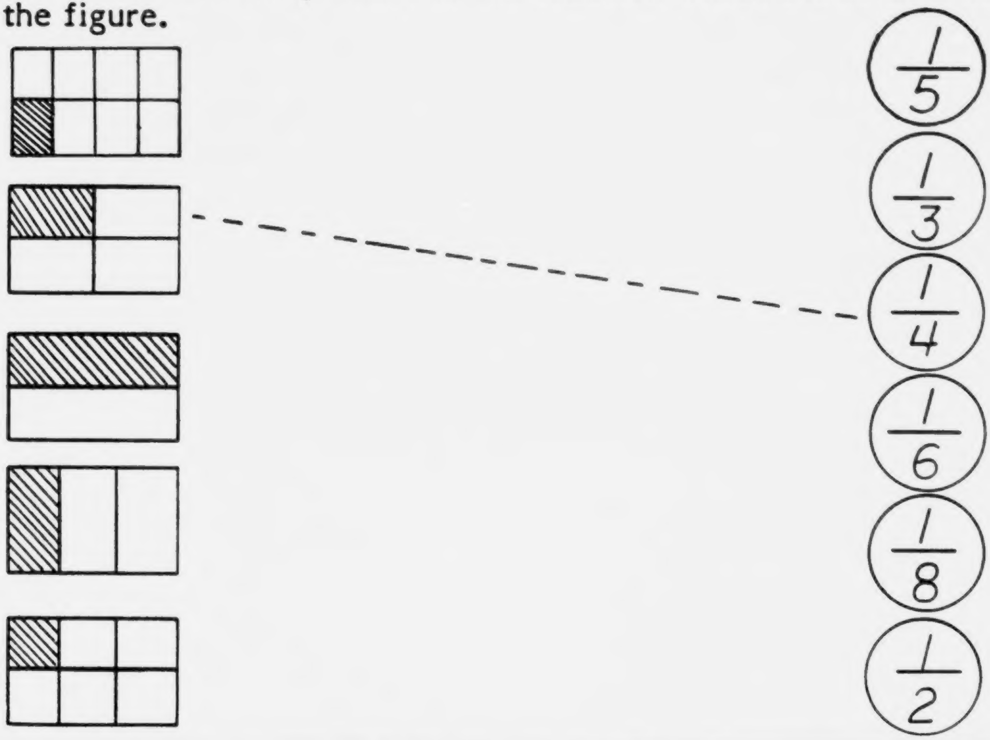
The denominator 4 is the total number of parts.

Cross out the word which does not belong.

The 1 in the fraction $\frac{1}{4}$ is the (numerator, denominator).

The 4 in the fraction $\frac{1}{4}$ is the (numerator, denominator).

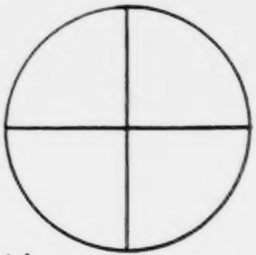
Draw a line from the picture to the fraction which shows the shaded part of the figure.



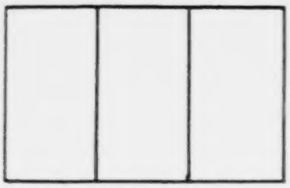
P.O. 3.06.01.02

NAME: ______________________ CLASS: ________ DATE: ________

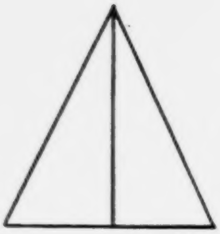
How many parts of each figure are needed to make the whole figure?



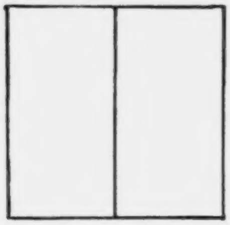
4 fourths



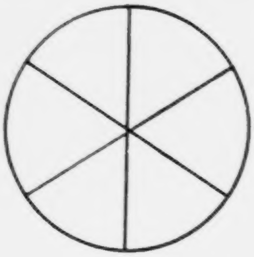
___ thirds



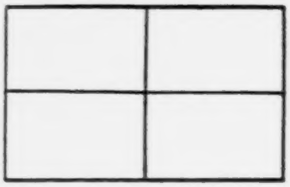
___ halves



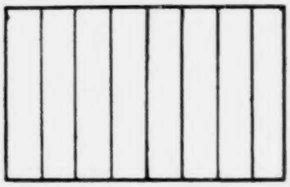
___ halves



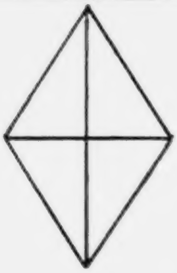
___ sixths



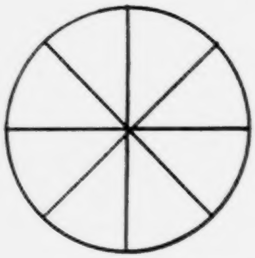
___ fourths



___ eighths

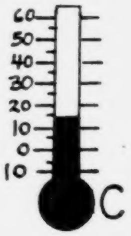


___ fourths

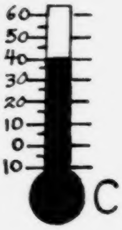


___ eighths

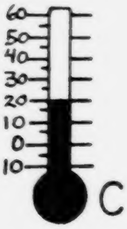
Do you remember?


60
50
40
30
20
10
0
10
C

15°C


60
50
40
30
20
10
0
10
C

____

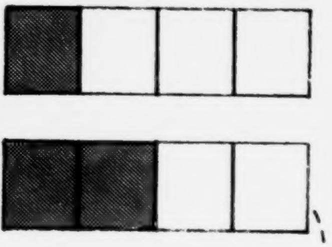

60
50
40
30
20
10
0
10
C

____

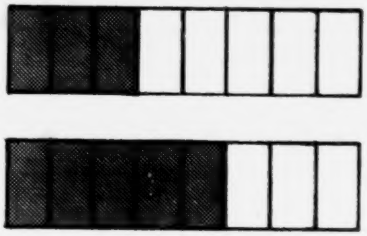
P.O. 3.06.01.03

NAME: ______________________________ CLASS: __________ DATE: __________

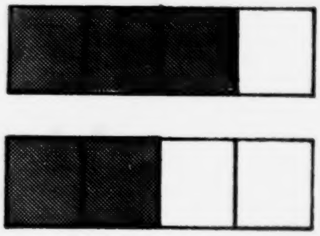
Draw a line from the fraction to its matching picture. Write > or < in the circle between each pair of fractions so that the resulting statement is correct.



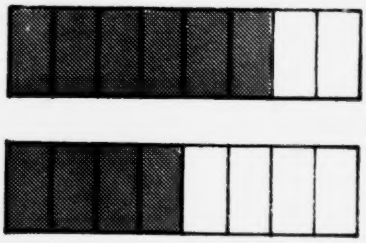
$\frac{1}{4}$ (<) $\frac{2}{4}$



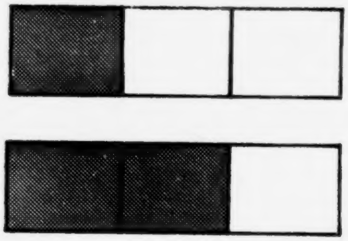
$\frac{3}{8}$ ◯ $\frac{5}{8}$



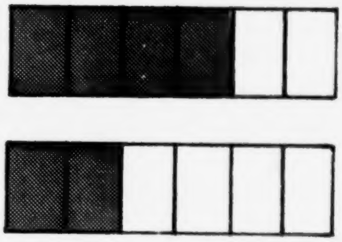
$\frac{3}{4}$ ◯ $\frac{2}{4}$



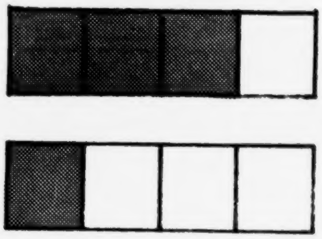
$\frac{6}{8}$ ◯ $\frac{4}{8}$



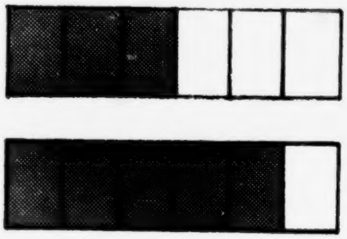
$\frac{1}{3}$ ◯ $\frac{2}{3}$



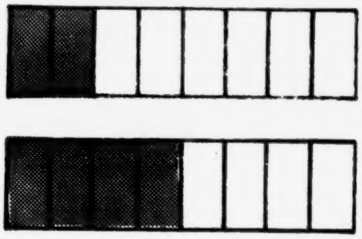
$\frac{4}{6}$ ◯ $\frac{2}{6}$



$\frac{3}{4}$ ◯ $\frac{1}{4}$



$\frac{3}{6}$ ◯ $\frac{5}{6}$

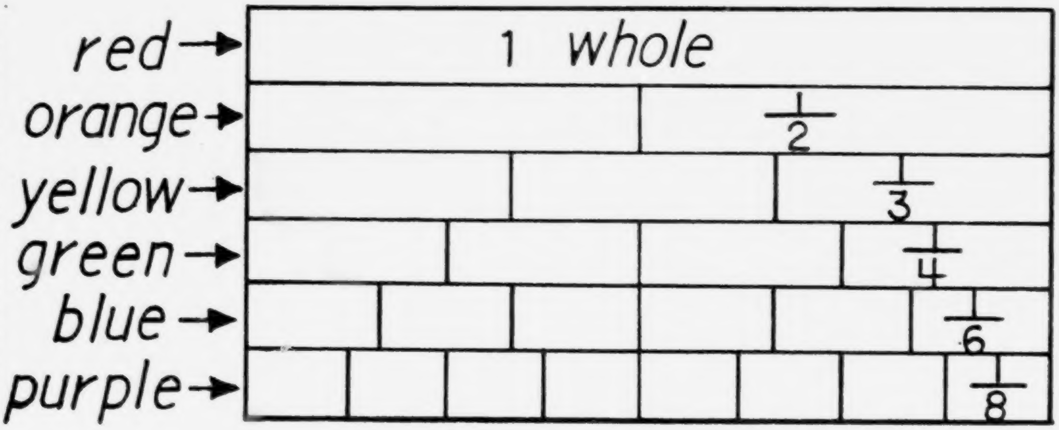


$\frac{2}{8}$ ◯ $\frac{4}{8}$

P.O. 3.06.01.04

NAME: ______________________________ CLASS: __________ DATE: __________

Color each fraction bar. Use the fraction bars to answer the questions.


red
orange
yellow
green
blue
purple
1 whole
1/2
1/3
1/4
1/6
1/8

$\frac{2}{4} = \frac{\square}{2}$	$\frac{4}{8} = \frac{\square}{2}$
$\frac{2}{6} = \frac{\square}{3}$	$\frac{2}{3} = \frac{\square}{6}$
$\frac{2}{2} = \frac{\square}{\text{WHOLE}}$	$\frac{4}{8} = \frac{\square}{2}$

Do you remember?

526 = ______ hundreds + ______ tens + ______ ones

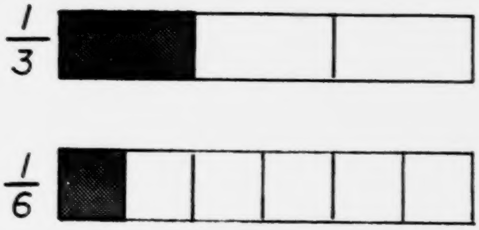
870 = ______ hundreds + ______ tens + ______ ones

639 = ______ hundreds + ______ tens + ______ ones

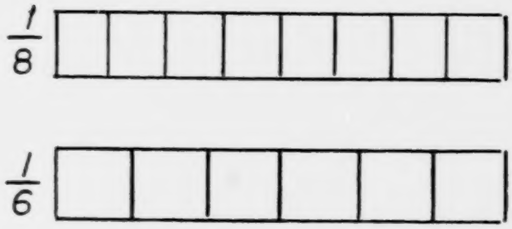
P.O. 3.06.01.04

NAME: ______________________ CLASS: __________ DATE: __________

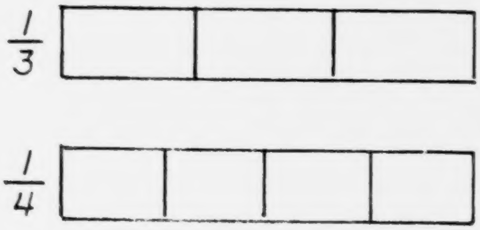
Color the part named by the fraction. Write the symbol > or < in each circle to form correct number sentences.



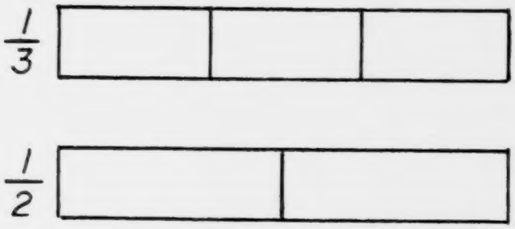
$\frac{1}{6} < \frac{1}{3}$



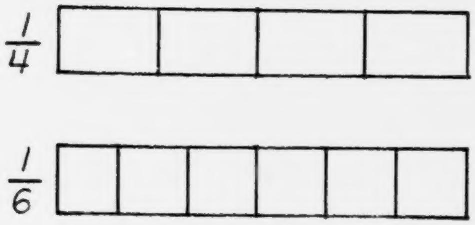
$\frac{1}{8} \bigcirc \frac{1}{6}$



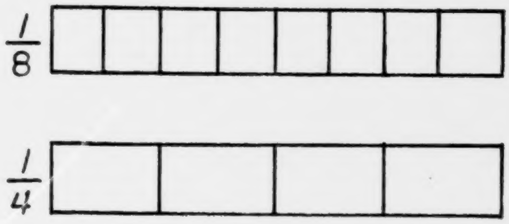
$\frac{1}{3} \bigcirc \frac{1}{4}$



$\frac{1}{3} \bigcirc \frac{1}{2}$



$\frac{1}{4} \bigcirc \frac{1}{6}$



$\frac{1}{8} \bigcirc \frac{1}{4}$

Do you remember? Write these numbers in decreasing order.

361 874 519 714 436 207

decreasing order 874, ______, ______, ______, ______, 207

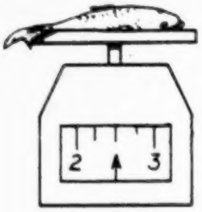
3.10.04 WEIGHT IN CUSTOMARY UNITS

(1 lesson)

PERFORMANCE OBJECTIVES

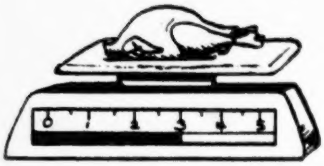
The student will be able to...

3.10.04.01B weigh familiar objects to the nearest whole pound, $\frac{1}{2}$ pound and, $\frac{1}{4}$ pound; e.g.,

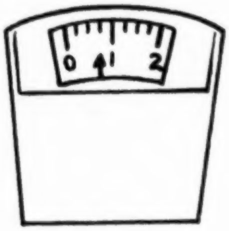


How much does the fish weigh to the nearest half pound?

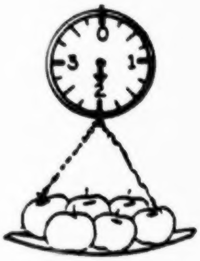
*3.10.04.02A read various types of scales using customary units. e.g.,



3 lbs.



$\frac{3}{4}$lb. (12 oz.)



2 lbs.

3.10.04

VOCABULARY

TERMS	SYMBOLS
pound	lb.
ounces	ozs.

GETTING STARTED 1:

Prepare and display a chart with the units of measurement for weight. e.g.,

ounces	pounds

Say, "What do we call the units of measurement for weight? (We measure weight in pounds and ounces.) Would we weigh a bag of apples in ounces or in pounds?...three pencils...? (We would weigh a bag of apples in pounds...three pencils in ounces.) Let's complete the chart with items that we can weigh in pounds or in ounces." Elicit the names of items from the students. Ask the students to write the name of each item under the appropriate column on the chart. Say, "What kinds of items are measured in pounds? (Heavy items, such as a bag of potatoes, are measured in pounds.) What kinds of items are measured in ounces?" (Small items, such as a glass of juice, are measured in ounces.)

3.10.04

3.10.04.01 **weigh familiar objects to the nearest whole pound, $\frac{1}{2}$ pound, and $\frac{1}{4}$ pound**

STRATEGY 1: Prepare and display 16 discs, a scale that measures weight in ounces and pounds, and several items to be weighed, e.g., a book, a pencil, glue, a stapler. Display a chart on the chalkboard.

e.g.,

ITEM	ESTIMATED WEIGHT	ACTUAL WEIGHT

Say, "We know that objects can be weighed either in ounces or in pounds. Which is heavier, an ounce or a pound? (A pound is heavier.) How many ounces are there in 1 pound?" (There are 16 ounces in 1 pound.) Indicate 16 ounces on the scale. On the chalkboard write 16 ounces = 1 pound. Say, "How many ounces are in $\frac{1}{2}$ pound if there are 16 ounces in 1 pound? Let's divide 16 discs into two equal groups. How many discs are in each group? (There are 8 discs in each group.) How much is one-half of 16?" (One-half of 16 equals 8.) On the chalkboard, write $\frac{1}{2}$ pound = 8 ounces. Ask a student to estimate the weight of an item which weighs about $\frac{1}{2}$ pound, e.g., a workbook, a shoe, a full box of chalk. Write the name and the estimated weight of the item on the chart, and then weigh the item. Repeat this procedure for objects to the nearest $\frac{1}{4}$ pound. Ask various students to hold each object, estimate its weight and record the estimated weight on the chart. Ask other students to weigh each object and record the actual weights to the nearest pound, $\frac{1}{2}$ pound, and $\frac{1}{4}$ pound on the chart.

3.10.04

3.10.04.02 read various types of scales using customary units

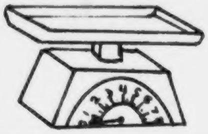
STRATEGY 1: Prepare and display various types of scales, e.g., bathroom scale, postage scale, pan balance. Say, "What can you weigh on each type of scale?" Accept all reasonable responses.

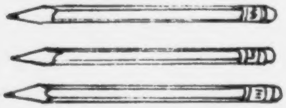
Divide the students into small groups. Say, "Each group will select several items and decide which scale would be the most appropriate for weighing each item. One student from each group will record the name of the item, the type of scale used, and the actual weight of the object in pounds or in ounces." Ask the students to compare the weights of the objects and the findings for each group.

P.O. 3.10.04.01

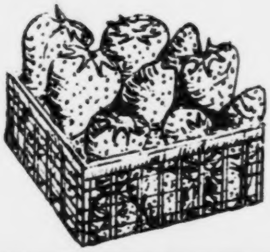
NAME: ______________________ CLASS: ________ DATE: ________

Complete the table by using a scale to weigh each object.


Scale

object	nearest $\frac{1}{4}$ pound	object	nearest $\frac{1}{4}$ pound
dictionary		pencils 	
ruler		milk	
box of crayons		plant	
shoe		books	

CHALLENGE!



Two pounds of strawberries cost $3.00. How much does one pound of strawberries cost? ________________

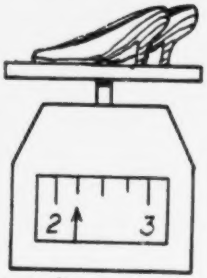
How much do three pounds of strawberries cost? ________________

How much more do three pounds of strawberries cost than one pound of strawberries? ________________

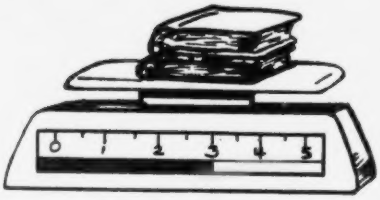
P.O. 3.10.04.02

NAME: ______________________ CLASS: ________ DATE: ______

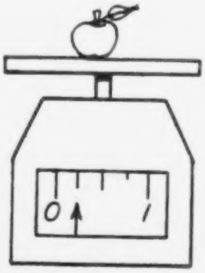
Write the weight of each object to the nearest pound, $\frac{1}{2}$ pound, or $\frac{1}{4}$ pound.



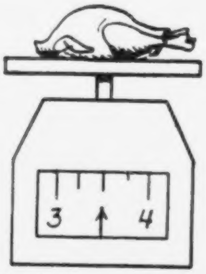
Weight= $2\frac{1}{4}$ lbs.



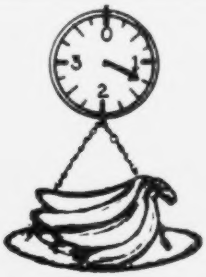
Weight= ______ lbs.



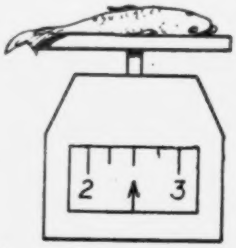
Weight= ______ lb



Weight= ______ lbs.



Weight= ______ lbs.



Weight= ______ lbs.

Do you remember?

Round each number to the nearest ten.

237 rounds to 240. 198 rounds to ____.

362 rounds to ____. 721 rounds to ____.

453 rounds to ____. 906 rounds to ____.

825 rounds to ____. 803 rounds to ____.

SHARPENING YOUR SKILLS

Units 14, 15, 16

Name: ____________ **Class:** ________ **Date:** ________

1. Which number makes each number sentence true?

3 x ☐ = 3   ☐ x 3 = 3

ⓐ 12   ⓑ 6   ⓒ 1   ⓓ 0

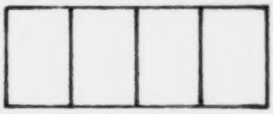
2. When a number is multiplied by zero, the product is _____.

ⓔ one more than the number
ⓕ the number
ⓖ one
ⓗ zero

3. In the fraction $\frac{3}{5}$, the denominator is _______.

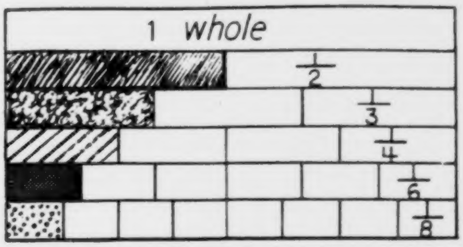
ⓐ 2   ⓑ 3   ⓒ 5   ⓓ 8

4. What kind of line can be drawn to change the model from fourths to eighths?



ⓔ one diagonal line
ⓕ one vertical line
ⓖ one horizontal line
ⓗ none of these

Use this chart to answer questions 5 through 7.



5. $1 \bigcirc \frac{1}{2}$

ⓐ >   ⓑ <   ⓒ =   ⓓ none of these

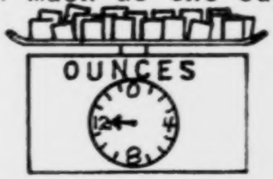
6. $\frac{3}{8} \bigcirc \frac{5}{8}$

ⓔ >   ⓕ <   ⓖ =   ⓗ none of these

7. $\frac{1}{4} \bigcirc \frac{5}{6}$

ⓐ >   ⓑ <   ⓒ =   ⓓ none of these

8. How much do the cubes weigh?



ⓔ more than a pound
ⓕ less than a pound
ⓖ one pound
ⓗ 12 pounds

3.11.01 OPEN SENTENCES

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.11.01.01A identify and solve open number sentences; e.g.,

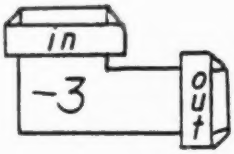
$11 + 3 = \square$ $12 - 7 = \square$

$\square + 3 = 14$ $12 - \square = 5$

$5 \times 3 = \square$ $20 \div 5 = \square$

$\square \times 3 = 15$ $20 \div \square = 4$

3.11.01.02A use tables to show number relationships. e.g.,



IN	20	19	18	17
OUT	17	16		

3.11.01

VOCABULARY

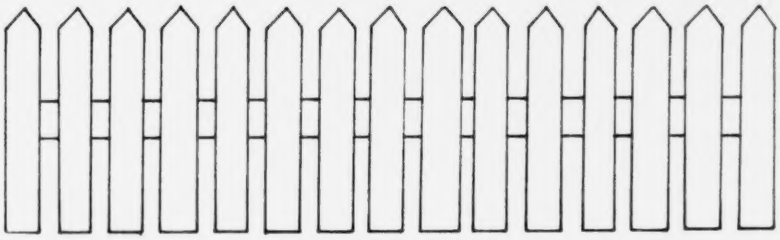
TERMS

open number sentence

GETTING STARTED 1:

Prepare and display a picture of a fence with 15 slats.

e.g.,



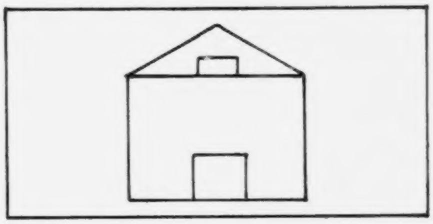
Say, "This fence needs to be painted." Ask a student to use chalk to shade in eight slats. Ask a student to describe the events in this story. Say, "What is a number sentence for this story? (15 - 8 = □) How many more slats must be painted?" (7 more slats must be painted.) Write 7 in the □ .

Repeat this procedure using stories which will elicit open number sentences with missing minuends, subtrahends, addends, differences and sums.

GETTING STARTED 2:

On the chalkboard draw a large rectangle representing a barnyard and draw a barn inside the barnyard.

e.g.,



Prepare a set of ten animal pictures and tape them inside the 'barnyard'. Say, "The farmer has ten animals in his barnyard. Each time the owner comes to the yard, he counts his animals. Sometimes there are animals inside the barn and he cannot count them. Close

GETTING STARTED 2: cont'd

your eyes as I place some animals inside the barn. (Remove four pictures.) How many animals do you see inside the barnyard?" (I see 6 animals.) Ask several students to describe what happened. (We started with ten animals. Some animals went into the barn. Now we see only 6 animals.) On the chalkboard write $10 - \square = 6$. Say, "How many animals are not seen?" (4 animals are not seen.) Write 4 in the box.

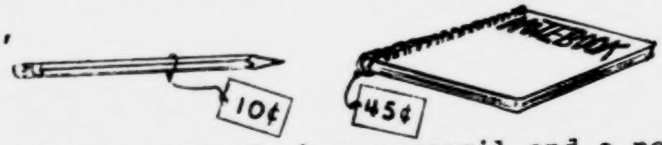
Repeat this procedure using stories which will elicit open number sentences with missing minuends, subtrahends, addends, differences and sums.

3.11.01

3.11.01.01 **identify and solve open number sentences**

STRATEGY 1: Prepare and display 2 items each with a price tag.

e.g.,



Say, "Randy wants to buy a pencil and a notebook. What number sentence can he write which will help him solve this problem?" Ask a student to write the number sentence on the chalkboard, e.g., 10¢ + 45¢ = □. Say, "When a number is missing from a number sentence it is called an open number sentence. What part of this open number sentence is missing?" (The sum is missing.) Ask a student to find the sum and write it in the □.

Remove the picture of the pencil. Say, "Jane will buy a pencil and a notebook. She knows the price of the notebook is 45¢. The storekeeper tells her that a pencil and a notebook together will cost 55¢. If Jane uses addition to solve the problem, how can she determine the cost of the pencil?" (She can write the number sentence, □ + 45 = 55.) What part of the open number sentence is missing? (An addend is missing.) To find a missing addend we subtract the known addend from the sum. If we subtract 45 from 55, what is the cost of the pencil?" Ask a student to write the appropriate subtraction example next to the open number sentence.

e.g.,

□ + 45 = 55

55	total cost
-45	cost of notebook
10	cost of pencil

Say, "What is the answer to the problem?" (The missing addend in the open number sentence, □ + 45 = 55, is 10.)

Say, "Compare the two examples. How are they different. (In the first example, the sum was

STRATEGY 1: cont'd

missing. In the second example an addend was missing.) The number sentences for both story problems are called open number sentences. The method for finding the missing numbers was different."

Repeat this procedure using other open sentences.

3.11.01.02 **use tables to show number relationships**

STRATEGY 1: Divide the students into small groups. Prepare and distribute 20 chips to each group of students. Draw a function machine on the chalkboard.
e.g.,

x2	In	2	4	6	8	10
	Out	4	8			

Say, "Each number that goes into the machine must be multiplied by two. What is the product of two times two? (The product of two times two is four.) Show two groups of two with your chips." Ask the students to complete the table by counting chips and multiplying. When the table is complete say, "What patterns do you see in this table? (The output is double the input and the output always increases by 4.) Why is it useful to write information on a table?" (A table helps us see patterns and number relationships.)

Repeat this procedure to demonstrate other addition, subtraction, multiplication and division relationships.
e.g.,

÷5	In	20	25	30	35	?
	Out	4	5	?	?	?

STRATEGY 2: Draw an outline of a barn and barnyard on the chalkboard.

e.g.,

barn	In	36	34	32	30	28
-2	Out					

Say, "The farmer earned money by selling her animals to other farmers. She always sold two at a time. If the farmer starts with thirty-six animals and sells two, how many animals will she have left?" (The farmer will have thirty-four animals left.) Write 34 in the output box. Continue this procedure to complete the table. Say, "What number pattern do you see? (As the input numbers decreased by two the output numbers decreased by two.) How many sales can the farmer make? (The farmer can make 18 sales.) What does a table show us?" (A table helps us see number patterns and number relationships.)

Repeat this procedure to demonstrate other addition, subtraction, multiplication, and division patterns and relationships.

P.O. 3.11.01.01-.02

NAME:______________________________ **CLASS:**________ **DATE:**_______

Follow the directions below.

Circle and solve the open number sentences.

$12 \times 2 = \boxed{24}$

$5 \times \square = 15$

$16 \div 8 = \square$

$\square - 10 = 8$

$\square + 10 = 18$

$14 - 6 = \square$

$4 \times \square = 20$

$20 \div \square = 5$

Fill in the numbers for each function machine. What number relationships did you find?

× 3	in	10	11	12	13
	out	30	33		

As each input increased by one, each output increased by three.

÷ 3	in	21	18	15	12
	out				

× 6	in	2	3	4	5
	out				

÷ 4	in	28	24	20	16
	out				

3.01.05 EVEN AND ODD NUMBERS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.01.05.01A identify even and odd addition patterns of whole numbers;
e.g.,

4 (even)	7 (odd)	5 (odd)	6 (even)
+2 (even)	+5 (odd)	+2 (even)	+5 (odd)
6 (even)	12 (even)	7 (odd)	11 (odd)

*3.01.05.02A identify even and odd subtraction patterns of whole numbers.
e.g.,

8 (even)	9 (odd)	5 (odd)	6 (even)
-4 (even)	-5 (odd)	-4 (even)	-3 (odd)
4 (even)	4 (even)	1 (odd)	3 (odd)

VOCABULARY

TERMS

odd
even
pair

GETTING STARTED 1:

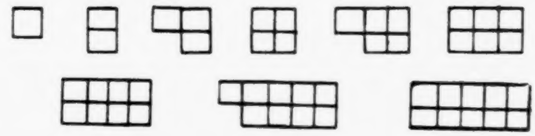
Ask 15 students to stand at the front of the classroom. Say, "How can we decide if 15 is an odd or an even number?" (Accept all reasonable responses.) Ask the students to stand in pairs. Say, "Does everyone have a partner? (No, 1 person does not.) How does this tell us that 15 is an odd number?" (An odd number can be separated into groups of 2 with 1 left over.) Repeat this procedure using groups of students to show odd and even arrangements.

Say, "How is an odd number different from an even number?" (An even number can be separated into groups of 2 without any left over.)

GETTING STARTED 2:

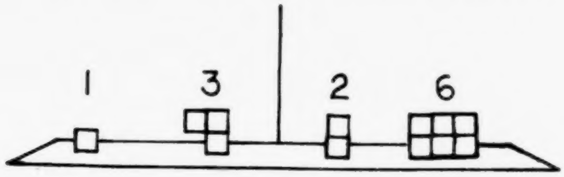
Prepare cardboard or oaktag pieces and place them in a brown paper bag.

e.g.,



Draw a vertical line on the chalkboard. Select and sort the pieces from the bag, placing even amounts on the left and odd amounts on the right. Say, "How are the pieces being sorted?" (Pieces showing even numbers are on the right and pieces showing odd numbers are on the left.) Ask a student to select a piece from the bag and place it on the appropriate side of the chalkboard ledge. Repeat this procedure until all the pieces have been sorted. Ask the students to write the corresponding numeral above each piece.

e.g.,



3.01.05

3.01.05.01 identify even and odd addition patterns of whole numbers

STRATEGY 1: Use the oaktag pieces prepared for Getting Started 2. Display an addition example and matching oaktag pieces.

e.g.,

$$\begin{array}{r} 4 \\ +\ 2 \\ \hline 6 \end{array}$$

Say, "What is the sum of the addends? (The sum of four plus two is six.) Is six an even or an odd number? (Six is an even number.) How do you know that six is an even number?" (It can be separated into three groups of two without any left over.) Repeat this procedure using even addends only. Say, "What can we say about the sum of two even addends?" (The sum of two even addends is always even.) Try a few more examples to test this rule."

Repeat this procedure for odd plus odd addends and odd plus even addends. Lead the students to discover patterns and to write and say the rule for each pattern.

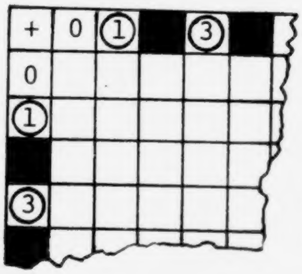
e.g.,

$$\begin{array}{r} \text{even} \\ +\text{even} \\ \hline \text{even} \end{array} \quad \begin{array}{r} 6 \\ +4 \\ \hline 10 \end{array} \qquad \begin{array}{r} \text{odd} \\ +\text{odd} \\ \hline \text{even} \end{array} \quad \begin{array}{r} 3 \\ +5 \\ \hline 8 \end{array} \qquad \begin{array}{r} \text{odd} \\ +\text{even} \\ \hline \text{odd} \end{array} \quad \begin{array}{r} 7 \\ +2 \\ \hline 9 \end{array} \qquad \begin{array}{r} \text{even} \\ +\text{odd} \\ \hline \text{odd} \end{array} \quad \begin{array}{r} 6 \\ +1 \\ \hline 7 \end{array}$$

Say, "How can we determine if a 2- or 3-digit number is odd or even?" (The digit in the ones place determines whether a number is odd or even. If the digit is 1, 3, 5, 7, or 9, the number is odd. If the digit is 0, 2, 4, 6, or 8, the number is even.) On the chalkboard write 429. Say, "Is this number even or odd? (It is an odd number.) How do you know?" (The digit in the ones place is a 9 which is odd. Therefore 429 is odd.)

STRATEGY 2: Prepare and distribute the worksheet on page 23a. Display a similar addition grid. Say, "Circle the numbers that are odd. Shade the numbers that are even."

e.g.,



Say, "What is the sum of the addends two and five?" (Two plus five equals seven.) Write the sum in the box. Say, "Is two an even or an odd number? (Two is an even number.) Is five an even or an odd number? (Five is an odd number.) Is seven an even or an odd number? (Seven is an odd number.) Therefore, two, an even number, plus five, an odd number, equals seven, an odd number." Write the pattern on the chalkboard.

e.g.,

2	even
+5	odd
7	odd

Continue this procedure until the table is complete and the rules for sums of odd and even number patterns are established.

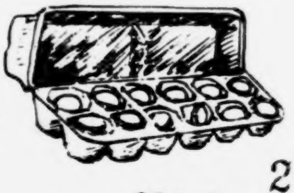
e.g.,

even	4	odd	9	odd	5	even	6
+even	+2	+odd	+3	+even	+2	+odd	+3
even	6	even	12	odd	7	odd	9

3.01.05.02 **identify even and odd subtraction patterns of whole numbers**

STRATEGY 1: Prepare and display an egg carton with a chip in each section.

e.g.,



218

STRATEGY 1: cont'd

Say, "How many chips are in the egg carton? (There are twelve chips in the egg carton.) Is twelve an even or an odd number? (Twelve is an even number.) How do you know?" (An even number can be separated into groups of two with nothing left over.) Ask a student to remove 2 chips from the box. Ask another student to write a number sentence for this subtraction, e.g., 12 - 2 = 10.

Continue subtracting numbers from 12 and elicit the rule: **An even number minus an even number equals an even number.**

Repeat this procedure by subtracting an odd number from an even number and elicit the rule: **An even number minus an odd number equals an odd number.**

Say, "The egg carton has seven chips. Is seven an even or an odd number? (Seven is an odd number.) How do you know?" (An odd number, when separated into groups of two, has one left over.) Remove 3 chips from the carton. Say, "How many chips are left?" (Four chips are left.) Ask a student to write a number story for this subtraction, e.g., 7 - 3 = 4.

Continue this procedure of subtracting an odd number from an odd number and elicit the rule: **An odd number minus an odd number equals an even number.**

Repeat this procedure by subtracting an even number from an odd number and elicit the rule: **An odd number minus an even number equals an odd number.**

STRATEGY 2: Adapt Strategy 2, P.O. 3.01.05.01.

P.O. 3.01.05.01-.02

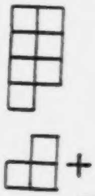
NAME: ______________________ CLASS: ________ DATE: ________

Complete each part below.

Write the sums on the table below. Circle the odd sums. Shade the even sums.

+	1	2	3	4	5
1	▨	③			
2					
3		⑤			▨
4					
5					

Find each sum or difference. Write odd or even next to each addend and sum.

 4 even +2 even ⑥ even	 5 ____ +4 ____ ○ odd	☐☐ ☒☐ ☒☒ ☒☒ 8 ____ -5 ____ ○ ____
 7 odd +3 odd ○ ____	☐☐☐ ☐☐☐ ☒☒☒ 9 ____ -3 ____ ○ ____	☐☐ ☐☐ ☒☒ 6 ____ -2 ____ ○ ____

CHALLENGE! I am a number between 50 and 70. I am greater than 57. I am less than 59. What number am I? ________

3.02.01 COMMUTATIVE AND ASSOCIATIVE PROPERTIES OF ADDITION THROUGH 999

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

3.02.01.01A use the commutative property of addition with numbers through 999;
e.g.,

$$7 + 5 = 5 + 7$$
$$23 + 12 = 12 + 23$$
$$256 + 314 = 314 + 256$$

3.02.01.02B use the associative property of addition with numbers through 999.
e.g.,

$$(2 + 4) + 7 = 2 + (4 + 7)$$

$$(200 + 30) + 6 = 200 + (30 + 6)$$

3.02.01

VOCABULARY

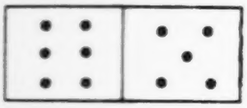
TERMS

commutative
associative
addends
sum
vertical
horizontal

GETTING STARTED 1:

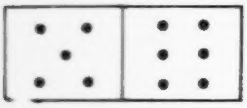
Prepare and display a set of domino dot cards. Select one of the cards to be used as a model for a number story.

e.g.,



Say, "How does this dot card tell a number story?" (This card has 6 dots on the left side and 5 dots on the right side. Altogether it has 11 dots. Six plus five equals eleven.) Ask a student to write the number sentence on the chalkboard, e.g., 6 + 5 = 11. Turn the dot card around.

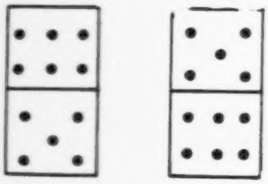
e.g.,



Say, "What number story can we tell now?" (There are 5 dots on the left side and six dots on the right side. Altogether there are 11 dots. Five plus six equals eleven.) Ask a student to write the number sentence on the chalkboard, e.g., 5 + 6 = 11. Say, "How are the number stories the same? (The number stories have the same addends and the same sum.) How are they different?" (The addends are reversed.)

Hold the cards vertically.

e.g.,



Say, "Is the sum the same when I hold the cards vertically?" (The sum is the same but the order of the addends is different.)

GETTING STARTED 1: cont'd

Say, "How can you write an addition example which shows a number story when the dot cards are displayed vertically?" (The example is written vertically.)

e.g.,

$$\begin{array}{r} 6 \\ +5 \\ \hline 11 \end{array} \qquad \begin{array}{r} 5 \\ +6 \\ \hline 11 \end{array}$$

Say, "What do you notice?" (The order of the addends, whether written horizontally or vertically, does not change the sum.)

GETTING STARTED 2:

Prepare and display models of number sentences using beads and string (gummed circles, interlocking cubes, interlocking circles). Each model should have 2 colors, e.g., O O O O O O O O O.

Say, "How can we use the beads and string to model a number sentence?" (We can string the 7 white beads together and then the 2 blue beads. It will show 9 beads altogether. The number sentence is seven plus two equals nine.) Ask a student to demonstrate with the beads and write the number sentence on the chalkboard, e.g., 7 + 2 = 9.

Say, "What is the number sentence if you begin with the blue beads and add the white beads?" (The number sentence is two plus seven equals nine.) Ask a student to demonstrate and write the number sentence on the chalkboard, e.g., ● ● O O O O O O O 2 + 7 = 9.

Repeat this procedure using other examples and models so that the students recognize that addition is commutative in both horizontal and vertical formats.

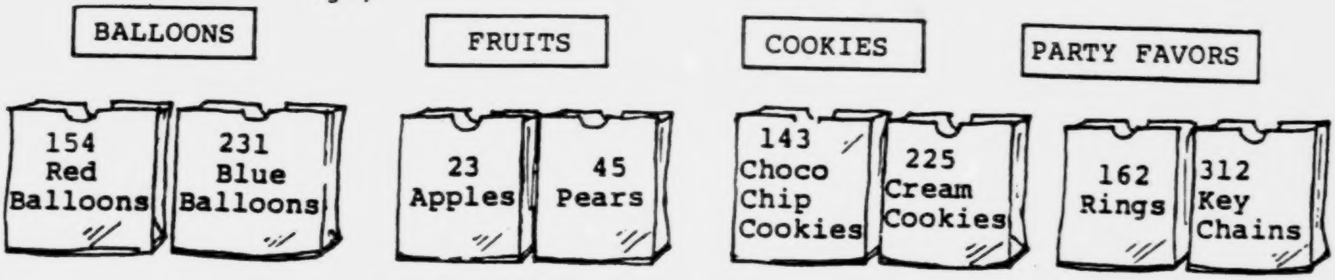
Say, "What happens to the sum when the addends are reversed?" (When the addends are reversed, the sum remains the same.)

3.02.01

3.02.01.01 **use the commutative property of addition with numbers through 999**

STRATEGY 1: Prepare and distribute worksheet 24a. Prepare and display paper bags "filled" with party treats. Place them at various locations around the room.

e.g.,


BALLOONS
FRUITS
COOKIES
PARTY FAVORS
154 Red Balloons
231 Blue Balloons
23 Apples
45 Pears
143 Choco Chip Cookies
225 Cream Cookies
162 Rings
312 Key Chains

Say, "We have learned that when adding two 1-digit addends, changing the positions of the addends does not change the sum. Let's see what happens when we change the positions of two 2-digit addends and two 3-digit addends."

Say, "Ms. Green is preparing food and party favors for a school party. She has placed the favors at different locations in the classroom. There are 2 bags of favors at each location. Find the totals for each location and record your results on your worksheet. How many balloons are there in all? (There are 385 balloons in all.) How do you know that?" (I added 154 + 231.) On the chalkboard write 154.

$$\begin{array}{r}154\\+231\\\hline 385\end{array}$$

Say, "Did someone find another way to find the total number of balloons?" (Yes, I added 231 + 154.) On the chalkboard write 231.

$$\begin{array}{r}231\\+154\\\hline 385\end{array}$$

Say, "How do the sums compare? (The sums are the same). Does reversing the position of the addends change the sum? (No.) What number sentence may we write to express this fact?" (154 + 231 = 231 + 154)

Repeat this procedure for the other party treats.

STRATEGY 1:
cont'd

Say, "What seems to be true about the sum of the two addends. (The sum of two addends are the same even if the addends are reversed.) Does this rule change if the number of digits in the addends changes? (No, the rule remains the same.) This rule is called the commutative property of addition."

STRATEGY 2:

Write the following statement on the chalkboard:

> The month of September has thirty days or
> four weeks and two days.

Say, "How many vowels were used to write this statement? (17 vowels were used.) How many consonants were used? (36 consonants were used.) Write a number story to show how many letters were used altogether." Ask a student to write his/her number story on the chalkboard, e.g., 17 + 36 = 53. Say, "How many letters are there in all? (There are 53 letters in all.) How did you find that? (I added the vowels plus the consonants.) Did someone find another way to find the sum? (Yes, I added the consonants and then the vowels). Please write and say your number story." (There are 36 consonants and 17 vowels, for a total of 53 letters. 36 + 17 = 53.)

Say, "Does the sum change if the addends are reversed? (No, the sum remains the same even if the addends are reversed.) What number sentence may we write to express this fact? (36 + 17 = 17 + 36) Is this also true for 3-digit numbers?" (Yes, the order of the addends does not affect the sum of 3-digit numbers.) Ask the students to test this rule by adding 3-digit numbers.

3.02.01.02 **use the associative property of addition with numbers through 999**

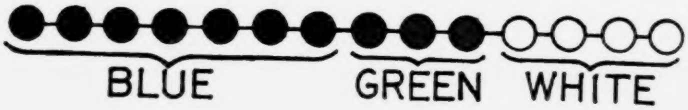
STRATEGY 1:

Prepare and display models of number stories using beads on a string, (gummed circles on adding machine

STRATEGY 1:
cont'd

tape, interlocking cubes). Each model should have 3 colors.

e.g.,



Say, "How can we use this string of beads to model a number story?" (The string of beads has 7 blue beads, 3 green beads, and 4 white beads. There are 14 beads altogether. The number story is seven plus three equals 10 and 4 more equals 14.) Write the number story on the chalkboard.

e.g.,

$7 + 3 + 4 = 14$

Say, "How can we find the sum of these three numbers?" (We can add 7 and 3 first, then add 4 or we can add 3 and 4 first and then add 7 or we can add 7 and 4 first and then add 3.) Write the following on the chalkboard:

We can add 7 and 3 first and then add 4; $7 + 3 + 4 = 14$.

or

We can add 3 and 4 first and then add 7; $3 + 4 + 7 = 14$.

or

We can add 7 and 4 first and then add 3; $7 + 4 + 3 = 14$.

Say, "To show which numbers should be added first, we use parentheses." On the chalkboard write $(7 + 3) + 4 = 14$. Say, "In this case, 7 + 3 is added first because 7 + 3 is in parentheses. 7 plus 3 equals 10. 10 plus 4 equals 14." On the chalkboard write $7 + (3 + 4) = 14$. Say, "Which numbers are added first?" (3 plus 4 are added first.) On the chalkboard write $(7 + 4) + 3 = 14$. Say, "Which numbers are added first? (7 + 4 are added first.) What do you notice about the sum of the numbers 7, 3, and 4?" (The sum is the same no matter what two numbers are grouped together when adding.)

STRATEGY 1: cont'd

On the chalkboard write the following rule:

The sum of three addends is the same no matter what two numbers are grouped together.

$$(7 + 3) + 4 = 14$$
$$7 + (3 + 4) = 14$$
$$(7 + 4) + 3 = 14$$
$$(7 + 3) + 4 = 7 + (3 + 4) = (7 + 4) + 3$$

Ask the students to copy the rule into their notebooks.

STRATEGY 2: Say, "Tunnels and bridges are used by cars and trucks each day. The number of vehicles which pass through each toll booth are counted." Prepare and display a chart.

e.g.,

BOOTH	A	B	C
CARS	201		
BUSES	42		
TRUCKS	5		
Total Number of Vehicles			

Say, "How can we find the total number of vehicles that passed through booth A?" (Add the number of cars, buses and trucks to find the total.) Ask a student to write his/her number story on the chalkboard, e.g., 201 + 42 + 5 = 248. Say, "Which numbers did you add first? (I added 201 + 42 first.) We can show that by placing parentheses around 201 + 42, e.g., (201 + 42) + 5 = 248. Did someone add them another way? (I added 42 + 5 first.) Did it change the sum?" (No.) Ask a student to write the number sentence to show that 42 + 5 is added first, e.g., 201 + (42 + 5) = 248. Say, "How did you

STRATEGY 2: cont'd

indicate that 42 + 5 should be added first?" (I placed parentheses around 42 + 5.)

Ask various students to rewrite, on the chalkboard, the order of the addends, both horizontally and vertically.

e.g.,

(201 + 5) + 42 = 248
(5 + 42) + 201 = 248
(201 + 42) + 5 = 248

$$\begin{array}{r} 201 \\ 5 \\ \underline{+\ 42} \end{array} \qquad \begin{array}{r} 5 \\ 42 \\ \underline{+201} \end{array} \qquad \begin{array}{r} 201 \\ 42 \\ \underline{+\ \ 5} \end{array}$$

Say, "How are these examples the same? (They all have the same addends.) How are they different?" (The addends are grouped differently.) Write the following on the chalkboard:

> The sum of three addends are the same no matter what numbers are grouped together.

(201 + 5) + 42 = 201 + (5 + 42) = (201 + 42) + 5 = 248

Ask the students to copy the rule into their notebooks.

Repeat this procedure for the other toll booths.

P.O. 3.02.01.01

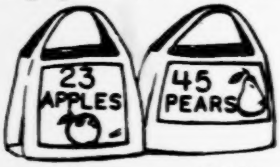
NAME: ________________________ CLASS: ________ DATE: ________

Find the number of treats at each location. Write two examples for each.

LOCATION 1

FRUIT

How many pieces of fruit in all?


23
APPLES
45
PEARS

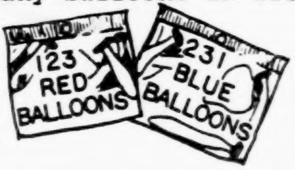
$$\begin{array}{r} 45 \\ +23 \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ +45 \\ \hline \end{array}$$

There are ______ pieces of fruit in all.

LOCATION 2

BALLOONS

How many balloons in all?

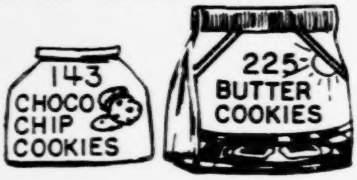

123
RED
BALLOONS
231
BLUE
BALLOONS

There are ______ balloons in all.

LOCATION 3

COOKIES

What is the total number of cookies?

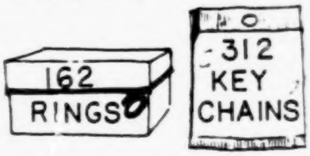

143
CHOCO
CHIP
COOKIES
225
BUTTER
COOKIES

There are ______ cookies in all.

LOCATION 4

PARTY FAVORS

How many party favors were bought?


162
RINGS
312
KEY
CHAINS

There are ______ party favors in all.

Complete each number sentence.

31 + 46 = ☐46 + 31

72 + 13 = 13 + ☐

60 + ☐ = 27 + 60

☐ + 49 = 49 + 33

753 + 174 = 174 + ☐

☐ + 205 = 205 + ☐

448 + 315 = ☐ + 448

116 + ☐ = 305 + 116

P.O. 3.02.01.02

NAME: ______________________ CLASS: ________ DATE: ________

Find the total number of vehicles to pass through each toll booth. Use parentheses to show which numbers are added together first.

Booth

Type of Vehicle		A	B	C	D	E	F
	Cars	200	100	9	400	300	600
	Buses	30	50	80	5	7	70
	Trucks	7	6	200	60	50	2
	Total Number of Vehicles	237					

A. (200+30)+7=237

B. ______________________

C. ______________________

D. ______________________

E. ______________________

F. ______________________

CHALLENGE!

Rewrite 3000 + 500 + 80 + 7 = ☐ in as many different ways as you can without changing its total value.

SHARPENING YOUR SKILLS

Units 17, 18, 19

Name: ____________________ **Class:** __________ **Date:** __________

1. 6 + ☐ = 15

8	6	9	7
ⓐ	ⓑ	ⓒ	ⓓ

2. There are 17 boys and 8 girls. How many more boys than girls are there ? Which open sentence fits the story?

ⓐ 17 + 8 = ☐
ⓑ 8 + 17 = ☐
ⓒ 17 x 8 = ☐
ⓓ 17 - 8 = ☐

3. ☐ x 3 = 15

12	5	8	not here
ⓐ	ⓑ	ⓒ	ⓓ

4.

BICYCLES	1	2	3	4
WHEELS	2	4	6	?

How many wheels will 4 bicycles have?

7	8	10	9
ⓐ	ⓑ	ⓒ	ⓓ

5.

IN	20	25	30
OUT	25	30	?

What is the missing number in the table?

35	31	20	not here
ⓐ	ⓑ	ⓒ	ⓓ

6. Fill in odd or even.

The sum of two odd numbers is an __________ number.

The difference between an odd number and an even number is an _________ number.

The sum of an even number and an odd number is an _________ number.

7. 10 + 12 = 12 + ☐

2	22	10	not here
ⓐ	ⓑ	ⓒ	ⓓ

8. ☐ + 123 = 123 + 35

ⓐ 35 ⓒ 123
ⓑ 158 ⓓ not here

9. Which number sentence is part of the same number family as 13 + 12 = 25?

ⓐ 13 - 12 = 25
ⓑ 12 + 13 = 25
ⓒ 13 x 12 = 25
ⓓ not here

10. (20 + 10) + 5 = 20 + (☐ + 5)

20	10	5	not here
ⓐ	ⓑ	ⓒ	ⓓ

Unit 20

3.02.02 ADDITION OF 3-DIGIT NUMBERS WITHOUT REGROUPING (EXCHANGE)

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

3.02.02.01A add two 3-digit numbers without regrouping (exchange) and check; e.g.,

$$\begin{array}{r} 516 \\ +322 \\ \hline 838 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 322 \\ +516 \\ \hline 838 \end{array}$$

*3.02.02.02A compute addition examples having sums to $9.99 without regrouping (exchange) and check; e.g.,

$$\begin{array}{r} \$3.15 \\ +1.31 \\ \hline \$4.46 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \$1.31 \\ +3.15 \\ \hline \$4.46 \end{array}$$

3.02.02.03A solve word problems related to skills learned in this module. e.g.,

> Mr. Jones drove 162 miles one day and 217 miles another day. How many miles did he drive all together?

3.02.02

VOCABULARY

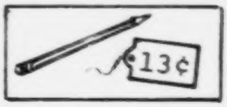
TERMS

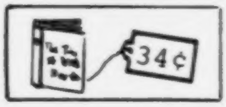
sum check
total

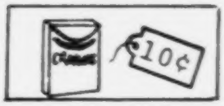
GETTING STARTED 1:

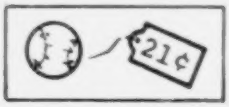
Display pictures of several items with price tags showing 2-digit numbers. The digits in the ones places should be 0 through 4 to avoid regrouping when adding.

e.g.,









Distribute a variety of coins to each student or group of students. Say, "You can buy any two items if you have enough money. How can you determine if you have enough money?" Accept all appropriate answers.

e.g.,

> I have 50¢ and I want to buy the pencil and the book. I will add 13¢ plus 34¢ which equals 47¢. With 50¢ I have enough money.

GETTING STARTED 2:

Write the following on the chalkboard:

1. $\begin{array}{r}31\\+26\\\hline\end{array}$ 2. $\begin{array}{r}22\\+33\\\hline\end{array}$ 3. $\begin{array}{r}14\\+34\\\hline\end{array}$ 4. $\begin{array}{r}36\\+13\\\hline\end{array}$ 5. $\begin{array}{r}35\\+21\\\hline\end{array}$

Say, "Add these examples and check. Use the key to find the mystery word." Write the following on the chalkboard:

56 = R 55 = U 57 = S 48 = P 49 = E

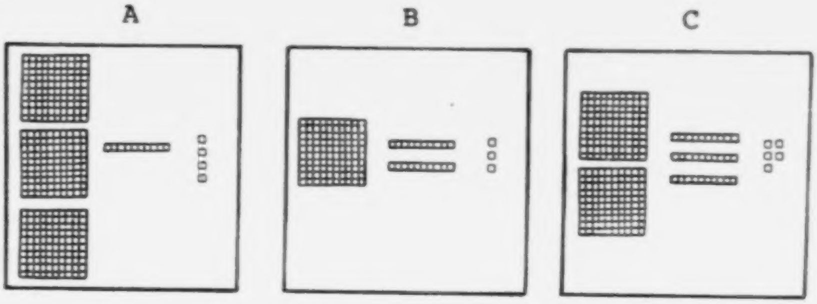
_____ _____ _____ _____ _____
1 2 3 4 5

3.02.02

3.02.02.01 **add two 3-digit numbers without regrouping (exchange) and check**

STRATEGY 1: Prepare and distribute squared material (hundreds, tens and ones) to each student. Display squared material representing the numbers 314, 123 and 235 on cards.

e.g.,



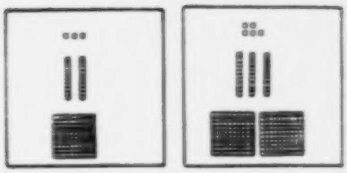
Say, "We have added 2-digit numbers. Now we will add 3-digit numbers." Ask the students to name the numbers which are represented on the cards. Say, "Which cards of squared material, when added together, equal the sum of 358?" Write on the chalkboard _____ + ____ = 358. Ask the students to use the squared material at their desks to help them determine which two groups of squared material, when combined, equal the sum of 358. Ask a student to work with the display material. Say, "Which 2 groups of ones squares will add up to eight? (The ones on cards B and C will add up to 8.) Let's join the squared material on cards B and C to check if these total 358. What is the value of the 5 in the tens column? (The value of 5 in the tens column is 50.) Which 2 groups of tens will add up to fifty? (The tens on cards B and C will add up to 50.) What is the value of 3 in the 358? (The value of 3 in 358 is 300.) Which 2 groups of hundreds will add up to 300? (The hundreds on cards B and C will add up to 300.)

STRATEGY 1: cont'd

How did you discover your answer?" (When I combined cards B and C, I found the sum of the two groups to be 358.) Accept other reasonable answers such as the following:

- I tried different combinations until I got a sum of 358.
- As soon as I added the ones I was able to eliminate card A because I knew the answer had 8 ones in it.

e.g.,



1 hundred 2 tens 3 ones 123
2 hundred 3 tens 5 ones +235
358

Say, "Explain if it matters if we show the numbers in reverse order? (No, it would not. It would also be a way to check the sum since addition is commutative.) Can you explain that in another way?" (The order of the addends does not change the sum in addition.)

STRATEGY 2: Prepare and display sets of cards which can be used to model numbers in expanded form.

e.g.,

100	200	300	400
10	20	30	40
1	2	3	4

Write the number 423 on the chalkboard. Ask a student to come to the chalkboard and select the numbers cards which will represent the number 423 in expanded form. Ask another student to select the number cards which will represent the number 234 in expanded form.

e.g.,

$$423 = \boxed{400} + \boxed{20} + \boxed{3}$$
$$234 = \boxed{200} + \boxed{30} + \boxed{4}$$

STRATEGY 2: cont'd

Say, "When you add, in which place do you begin? (You begin to add in the ones place.) How do you find the sum? (You find the sum by adding the ones, the tens, and the hundreds.) Find the sum." Write the following on the chalkboard as the steps are elicited:

$$\begin{array}{rcl} 423 & = & 400 + 20 + 3 \\ \underline{+234} & = & \underline{200 + 30 + 4} \\ 657 & = & 600 + 50 + 7 \end{array}$$

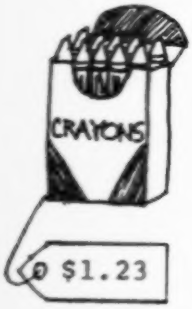
Say, "How can we check the answer? (We can check the answer by rearranging the order of the addends and adding them.) What rule is being used to check our answer? (The commutative rule for addition is being used to check our answer.) What does this rule state?" (The order of the addends does not affect the sum.) Demonstrate by reversing the addends and writing the sum on the chalkboard.

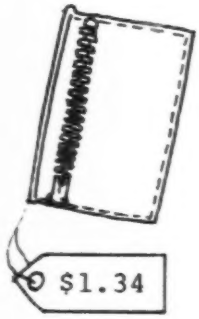
Repeat this procedure using other numbers in expanded form to demonstrate adding and checking 3-digit numbers.

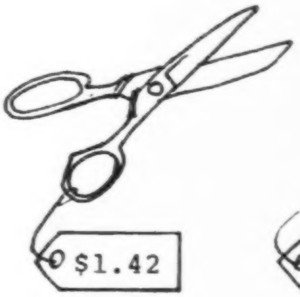
3.02.02.02 **compute addition examples having sums to $9.99 without regrouping (exchange) and check**

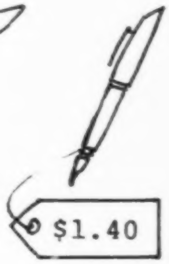
STRATEGY 1: Prepare play money and display pictures of items with price tags.

e.g.,









STRATEGY 1: cont'd

Ask the students to work in pairs using the play money to model the cost of their purchases. Say, "Each student may purchase one item by placing his or her play money on the placemat. How much did both of you spend altogether?" (We spent $2.76 all together.) Demonstrate on the chalkboard as the students write in their notebooks.

e.g.,

		Dollars	Dimes	Pennies
cost of pencil case	$1.34	$1	ⓓ ⓓ ⓓ	ⓟ ⓟ ⓟ ⓟ
cost of scissors	$1.42	$1	ⓓ ⓓ ⓓ ⓓ	ⓟ ⓟ
total cost or sum	$2.76			

Say, "What would happen if you wrote the cost of the scissors first and the pencil case second? (The sum would be the same.) Why?" (Addition is commutative. The order of the addends does not change the sum.) Demonstrate on the chalkboard as the students write in their notebooks.

e.g.,

		Dollars	Dimes	Pennies
cost of scissors	$1.42	$1	ⓓ ⓓ ⓓ ⓓ	ⓟ ⓟ
cost of pencil case	$1.34	$1	ⓓ ⓓ ⓓ	ⓟ ⓟ ⓟ ⓟ
total cost or sum	$2.76			

Say, "How did you know the answer was correct?" (By rearranging the order of the addends and adding it was possible to check the work.)

STRATEGY 2: Prepare and display a restaurant menu with prices.

e.g.,

LARGE SANDWICHES		LARGE DRINKS	
CHEESE	$1.20	MILK	$1.12
CHICKEN	$1.43	APPLE JUICE	$1.30
TURKEY	$1.34	CHOCO MILK	$1.14

STRATEGY 2: cont'd

Select a student. Say, "What will you choose to eat? (I will choose a cheese sandwich.) What will you choose to drink? (I will choose milk.) How much will you spend altogether?" (I will spend $2.32 for lunch.) On the chalkboard write:

cheese	(sandwich)	$1.20
milk	(drink)	$1.12
sum		$2.32

Say, "What would happen if you showed the cost of the drink first and the sandwich second? (The sum would be the same because addition is commutative. The order of the addends does not affect the sum.) How can you be sure your answer is correct?" (By rearranging the order of the addends and adding, I can check my work.)

Repeat this procedure until all possible combinations of a sandwich and a drink have been added and checked.

3.02.02.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Ask a student to read a problem which you have written on the chalkboard.

e.g.,

On Saturday morning Ernest
collected 436 cans. The next
day he collected 142 cans.
How many cans did he collect in all?

Say, "What do we want to know? (How many cans did Ernest collect?) What information are we given? (Ernest collected 436 cans and 142 cans.) What is the best way to solve this problem? (We must add to solve the problem.) How did you know that?" Accept all reasonable responses, e.g., I looked for a clue word. 'In all' usually means addition.) Say, "How will the

STRATEGY 1: cont'd

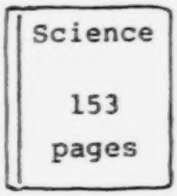
answer compare to the numbers given in the problem? (The answer will be greater than either of the numbers.) What is the answer? (578 cans were collected in all.) How can we check the computation?" (We can check the computation by reversing the addends and then adding.) On the chalkboard write the following:

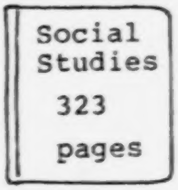
		check	
Saturday	436 cans	Sunday	142 cans
Sunday	+142 cans	Saturday	+436 cans
number of cans collected in all	578	sum	578 cans

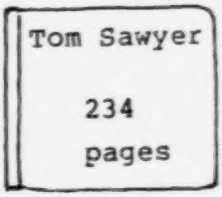
Repeat this procedure using other word problems that require addition of 3-digit numbers without regrouping.

STRATEGY 2: Prepare book covers which show the subject and the number of pages in each book. Display them on the chalkboard ledge.

e.g.,







Say, "Julia read two of these books. The two books she read have a total of 387 pages. Which two books did she read? What clue will tell you which two books Julia read? (The partial sum in the ones column is 7. That means she read either the Science book and Tom Sawyer or the Social Studies book and Tom Sawyer.) What other clue will you look for? (The partial sum of the tens column is 8 or 80.) Which two books have partial sums with a 7 in the ones column and an 8 in the tens column? (The Science book and Tom Sawyer.) Which books add up to

STRATEGY 2: cont'd

300 in the hundreds column?" (The Science book and Tom Sawyer.) Write the following on the chalkboard:

```
Science        153 pages
Tom Sawyer    +234 pages
               387 pages
```

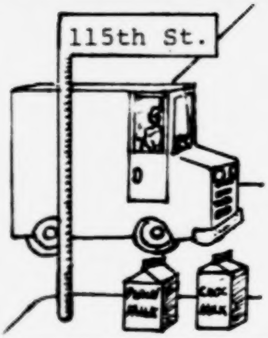
Say, "What is the answer to the problem?" Elicit and write on the chalkboard: Julia read Tom Sawyer and the Science book. Say, "Did someone discover another way to solve the problem? (Yes, I switched the order in which I added. I added 234 plus 153.) Did that affect the sum?" (No, because addition is commutative. In addition, the order in which you add the addends does not affect the sum. It is also another way to check your work.)

P.O. 3.02.02.01,.03

NAME:______________________________ CLASS:________ DATE:________

Solve each example and problem below.

Everyday the milkman delivers milk to a school on 115th Street. Yesterday, he delivered 425 containers of chocolate milk and 362 containers of plain milk. How many containers of milk did he deliver yesterday?



solve check

_____ containers of milk

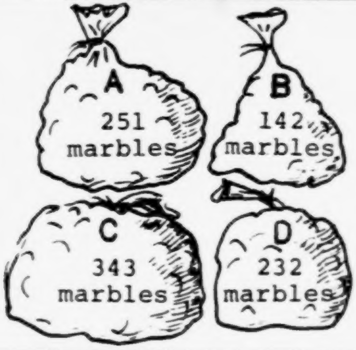
solve check

A trucker delivered books to school. He delivered 123 science books and 142 math books to Room 235. How many books did the trucker deliver?

_____ books

solve check

Marco wants to share his marbles with his sister Maria by giving her 2 bags of marbles containing 483 marbles. Which 2 bags of marbles should Marco give to Maria?



bag _____ and bag _____

solve

$$\begin{array}{r} 413 \\ +342 \\ \hline \end{array}$$

check

$$\begin{array}{r} 342 \\ +413 \\ \hline \end{array}$$

solve

$$\begin{array}{r} 804 \\ +192 \\ \hline \end{array}$$

check

____

solve

$$\begin{array}{r} 345 \\ +422 \\ \hline \end{array}$$

check

____

solve

$$\begin{array}{r} 718 \\ +241 \\ \hline \end{array}$$

check

____

P.O. 3.02.02.02-.03

NAME: ______________________ CLASS: ________ DATE: ________

Solve each example and problem below.

solve

$$\begin{array}{r} \$2.41 \\ +3.42 \\ \hline \$\quad . \end{array}$$

check

$$\begin{array}{r} \$3.42 \\ +2.41 \\ \hline \$\quad . \end{array}$$

solve

$$\begin{array}{r} \$4.02 \\ 3.40 \\ \hline \$\quad . \end{array}$$

check

solve

$$\begin{array}{r} \$1.22 \\ 5.23 \\ \hline \end{array}$$

check

solve

$$\begin{array}{r} \$4.31 \\ 2.14 \\ \hline \end{array}$$

check

At a book sale Kevin bought a 135 page science book for $1.23 and a 150 page notebook for $1.54. How much did he spend altogether?

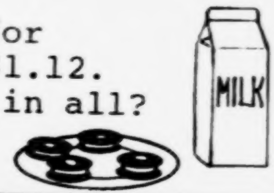
SCIENCE
NOTEBOOK

solve

check

He spent _____ all together.

Mrs. Ward bought milk for $1.25 and cookies for $1.12. How much did she spend in all?



solve

check

She spent _____ in all.

CHALLENGE!

At the school book fair, Joan bought a book and an item with which she could write. She spent a total of $2.48. Which two items did she buy?

solve

check

BOOK FAIR PRICE LIST:	
SCIENCE BOOKS	$1.23
MATH BOOKS	$1.42
FAIRY TALES	$1.34
CRAYONS	$1.14
PENCILS	$1.23
PENS	$1.35

Unit 21

3.03.01 SUBTRACTION OF 3-DIGIT NUMBERS WITHOUT REGROUPING (EXCHANGE)

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

3.03.01.01A subtract two 3-digit numbers without regrouping (exchange) and check;

e.g.,

$$\begin{array}{r} 938 \\ -515 \\ \hline 423 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 423 \\ +515 \\ \hline 938 \end{array}$$

3.03.01.02A subtract money through \$9.99 without regrouping (exchange) and check;

e.g.,

$$\begin{array}{r} \$8.38 \\ -5.16 \\ \hline \$3.22 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \$3.22 \\ +5.16 \\ \hline \$8.38 \end{array}$$

3.03.01.03A solve word problems related to skills learned in this module.

e.g.,

> Dorothy collected 376 soft drink cans in October and 125 soft drink cans in November. How many more cans were collected in October?

3.03.01

VOCABULARY

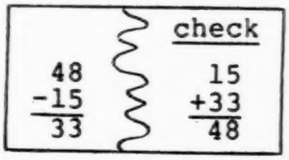
TERMS

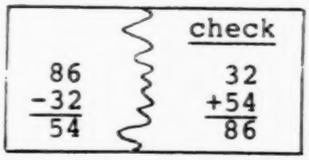
check
difference
more
less
left

GETTING STARTED 1:

Prepare several groups of puzzle pieces with subtraction examples and their related addition checks.

e.g.,



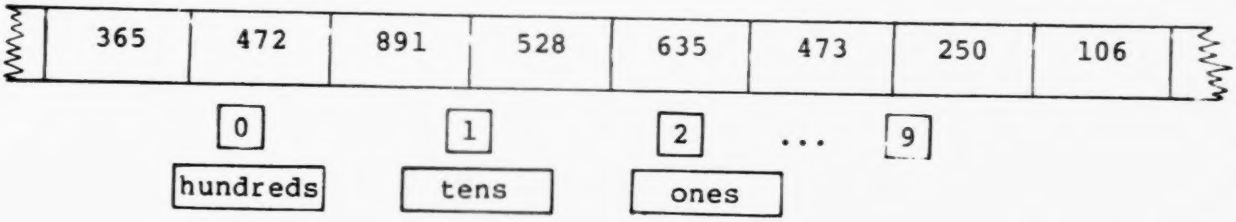


Distribute a group of pieces to each student or group of students. Display two matching pieces. Say, "Why are these examples shown on these matching pieces? (Addition and subtraction are inverse operations. To check the answer you must add the subtrahend and the difference.) You will match the puzzle pieces. Each subtraction example matches a check. The winner is the first student or group of students to match all the pieces in their group of puzzles." Ask the students to exchange groups of pieces and to repeat this procedure.

GETTING STARTED 2:

Prepare groups of numeral cards with the digits 0 through 9, cards with the words hundreds, tens, and ones, and strips of paper with several 3-digit numbers.

e.g.,



GETTING STARTED 2: cont'd

Divide the students into groups or teams and distribute the strips of 3-digit numbers. Place the numeral cards face down in one pile and place value cards face down in another pile. Ask one student to select a digit card and a word card.

e.g.,

9	tens

Say, "On your strip find a 3-digit number that has a 9 in the tens place. If there is a 3-digit number with a 9 in the tens place, write the initials of one of your teammates in that box."

e.g.,

365	472	891 A.R.	528	635	473	250	106

Repeat this procedure until there is a winning team. The winning team is the first to initial all the boxes on their strip. Say, "In which three numbers does the digit 3 have a different value?" (In 365 it has a value of 300, in 635 it has a value of 30, and in 473 it has a value of 3.) How would you look for the number with the greatest value? (I would look for the highest value in the hundreds place.) ... the least value?" (I would look for the least value in the hundreds place.)

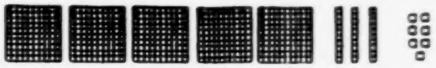
3.03.01

3.03.01.01 **subtract two 3-digit numbers without regrouping exchange and check**

STRATEGY 1: Prepare and distribute a set of squared material (hundreds, tens, ones) to each student or group of students. On the chalkboard write the number 537. Ask the students to use their squared material to display 537. On the chalkboard model the squared material next to the number.

e.g.,

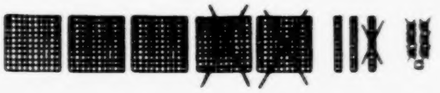
537



Write the number 216 below 537 on the chalkboard. Say, "From your display remove squared material which is equal to 216. How many ones will you remove? ... tens...? ... hundreds...? (I will remove 6 ones, 1 ten and 3 hundreds.) How many ones do you have left? ... tens...? ... hundreds...? (There are 1 one, 2 tens, and 3 hundreds left.) What is your answer?" As the students respond cross out the appropriate squared material on the chalkboard diagram.

e.g.,

$$\begin{array}{r} 537 \\ -216 \\ \hline 321 \end{array}$$



Say, "How do we know when regrouping is necessary? (Compare the digits in the minuend with the digits in the subtrahend. If the digits in the minuend are larger than the digits in the subtrahend, regrouping is not necessary.) In which column do we subtract first? ... second ... third?" (We subtract in the ones column first ... the tens column second ... the hundreds column third.)

Repeat this procedure with other 3-digit numbers.

STRATEGY 2: Write the number 837 on the chalkboard. Say,"What number is this? (This is 837.) How many ones are in this number? ... tens? ... hundreds?" (There are 7 ones, 3 tens, and 8 hundreds in 837.) Place "O"

STRATEGY 2: cont'd

above the ones digit, "T" above the tens digit, and "H" above the hundreds digit, e.g., $\begin{array}{ccc} H & T & O \\ \hline 8 & 3 & 7 \end{array}$ Say, "What must I do to find the difference between 837 and 516?" (I must subtract or take away to find the difference.) Write the example on the chalkboard.

e.g.,

$$\begin{array}{rccc} & H & T & O \\ \hline & 8 & 3 & 7 \\ - & 5 & 1 & 6 \\ \hline & 3 & 2 & 1 \end{array}$$

Say, "How many ones, tens, and hundreds are left?" (There are 1 one, 2 tens, and 3 hundreds left.) Write the students' responses on the chalkboard as they copy the example into their notebooks. Say, "Would the answer change if we begin the subtraction in the hundreds column? Explain. (The answer in this example would still be 516 because regrouping is not needed.) Why must we always begin the subtraction in the ones place? (It is important to begin in the ones place all the time so there is no confusion when we must regroup.) How can we check this example?" (One way is to add the difference to the subtrahend. If it equals the minuend, we probably subtracted correctly.)

e.g., check

$$\begin{array}{r} 837 \\ -516 \\ \hline 321 \end{array} \qquad \begin{array}{r} 321 \\ +516 \\ \hline 837 \end{array}$$

Repeat this procedure with other 3-digit numbers that do not require regrouping.

3.03.01.02 **subtract money through $9.99 without regrouping (exchange) and check**

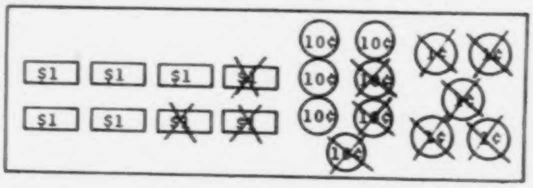
STRATEGY 1: Prepare and distribute sets of play money (bills and coins) to each student or group of students. On the chalkboard write $8.75. Ask the students to use the play money to model $8.75. Say, "$8.75 is the amount Sandy earned from deposits on empty cans and bottles. If Sandy spends $3.35 for a sandwich and a drink, how

STRATEGY 1: cont'd

much money will she have left? How can you solve this problem? (I can subtract or take away $3.35 from $8.75.) How will the amount she has left compare to $8.75?" (It will be less.) Ask a student to write the example on the chalkboard and model the example with the toy money.

e.g.,

$$\begin{array}{r} \$8.75 \\ \underline{-3.35} \end{array}$$



Ask a student to show the subtraction by taking away the appropriate money. Say, "In which column will you begin to subtract? (I will begin to subtract the pennies which represent the ones, then subtract the dimes which represent the tens, and then subtract the dollars which represent the hundreds.) What is the difference?" (The difference between $8.75 and $3.35 is $5.40.) How can you check your answer?" (Add the amount of money left, $5.40, to the amount subtracted, $3.35. The sum is $8.75.) Ask a student to show the check on the chalkboard.

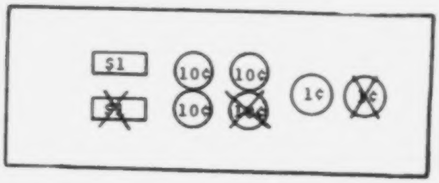
e.g.,

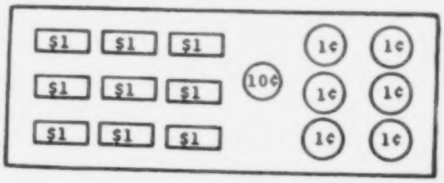
	check
$8.75	$5.40
-3.35	+3.35
$5.40	$8.75

NOTE: When using money the students should be led to discover the parallel between squared material and money; hundreds = dollars, tens = dimes, and ones = pennies.

STRATEGY 2: Prepare and display money cards for each student or group of students.

e.g.,

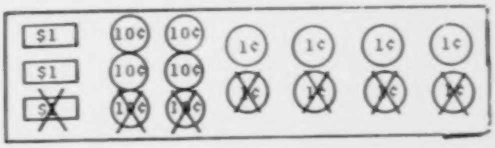




STRATEGY 2: cont'd

Say, "How much money is shown on the card? ($3.68) The X's show the amount of money taken away. How much money was taken away? ($1.24 was taken away.) How much money is not crossed out? ($2.44) How would you write this as an example?" (I would write a subtraction example.)

e.g.,



$$\begin{array}{r} \$3.68 \\ \underline{-1.24} \\ \$2.44 \end{array}$$

Say, "We will use the card to check our work. How much money has been subtracted? ($1.24 was subtracted.) How much money is left? ($2.44 is left.) If the amount crossed out and the amount left is equal to the original amount on the card, the answer is correct. When subtracting money, what must we always remember to place in the answer? (We must always place the symbols for money, the dollar and cent signs.) What do we call the answer in subtraction? (The answer in subtraction is called the 'difference'.) In which column do we always begin?" (We always begin in the ones place.)

3.03.01.03 **solve word problems related to skills learned in this module**

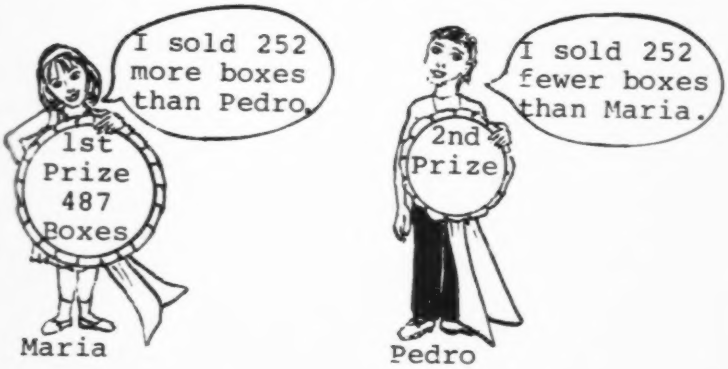
STRATEGY 1: Write the following story problem on the chalkboard:

> Maria and Pedro sold cookies. Maria won first prize by selling 487 boxes of cookies. That was 252 more than Pedro, the second prize winner, sold. How many boxes of cookies did Pedro sell?

STRATEGY 1:
cont'd

Say, "Here is a picture of Maria and Pedro.

e.g.,


I sold 252 more boxes than Pedro.
1st Prize 487 Boxes
Maria
I sold 252 fewer boxes than Maria.
2nd Prize
Pedro

Who can say the problem another way? (Maria sold 487 boxes of cookies. 487 is 252 more than the number of boxes Pedro sold.) How can we find the answer?" (We can subtract 252 from 487.) Ask a student to come to the chalkboard and write the corresponding numerical example.

e.g.,

487	number of boxes Maria sold in all
-252	number of boxes Maria sold more than Pedro
235	number of boxes Pedro sold

Say, "What is the answer to the problem?" (Pedro sold 335 boxes of cookies.) Were there any clues to help us solve this problem? (Yes, whenever we want to find the difference between two numbers we must subtract. In this problem, we wanted to find the difference between the number of boxes of cookies Maria sold and the number of boxes of cookies Pedro sold.) How can we check our work?" (We can add 252 and 235.)

e.g.,

$$\begin{array}{r} 487 \\ -252 \\ \hline 235 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 235 \\ +252 \\ \hline 487 \end{array}$$

P.O. 3.03.01.01 & .03

NAME: ____________________ **CLASS:** ________ **DATE:** ________

Check Mary's test paper. If an answer is correct, place a ✓ in the box. If an answer is incorrect, place an X in the box and redo the example on a separate sheet of paper. Give Mary 10 points for each correct answer.

P.S.
Class

Grade ___
Math Test

Mary
January 3

①

$$\begin{array}{r} 575 \\ -242 \\ \hline 333 \end{array}$$

☑

check

$$\begin{array}{r} 333 \\ +242 \\ \hline 575 \end{array}$$

②

$$\begin{array}{r} 385 \\ -214 \\ \hline 171 \end{array}$$

☐

check

③

$$\begin{array}{r} 786 \\ -421 \\ \hline 365 \end{array}$$

☐

check

④

$$\begin{array}{r} 935 \\ -413 \\ \hline 522 \end{array}$$

☐

check

⑤ On Monday 645 bags of popcorn were sold at the circus. On Tuesday 312 bags of popcorn were sold. How many more bags were sold on Monday?

$$\begin{array}{r} 645 \\ -\ 312 \\ \hline 957 \end{array}$$

957 more bags were sold on Monday.

⑥

$$\begin{array}{r} 678 \\ -214 \\ \hline 464 \end{array}$$

☐

check

⑦

$$\begin{array}{r} 273 \\ -121 \\ \hline 141 \end{array}$$

☐

check

⑧

$$\begin{array}{r} 418 \\ -104 \\ \hline 314 \end{array}$$

☐

check

⑨

$$\begin{array}{r} 675 \\ -314 \\ \hline 361 \end{array}$$

☐

check

⑩ The elephant trainer bought 849 pounds of peanuts for his elephants. The elephants ate 321 pounds of peanuts on Monday. How many pounds of peanuts were left?

$$\begin{array}{r} 849 \\ -\ 321 \\ \hline 528 \end{array}$$

528 pounds of peanuts were left.

Do you remember?

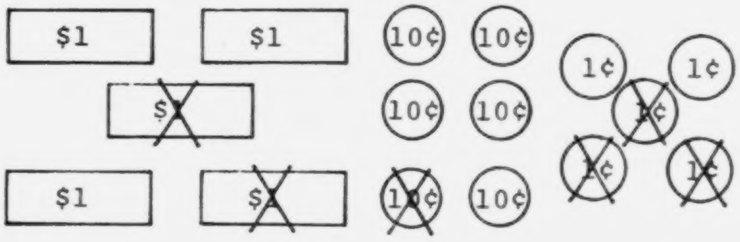
Guess the number.
It is a three-digit number.
Its numbers are in counting order.
It is an even number.
The sum of the digits is 9.
The number is ________.

Guess the number.
It is a two-digit number.
Both digits are the same.
It is an odd number.
The sum of the digits is 10.
The number is ________ .

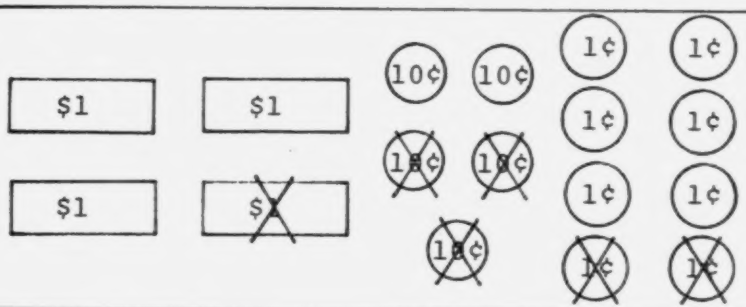
P.O. ____________

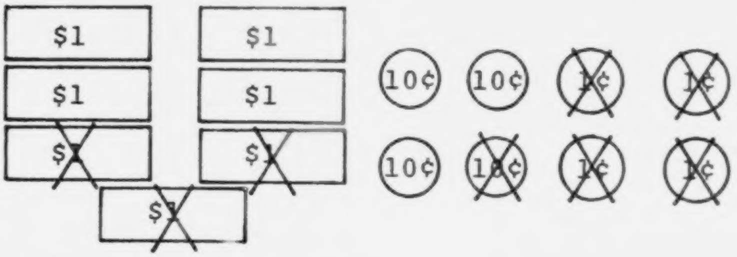
NAME: ______________________ CLASS: ________ DATE: ________

Write a subtraction example for each group of coins and bills. Check.


$1
$1
$1
$1
$1
10¢
10¢
10¢
10¢
10¢
10¢
1¢
1¢
1¢
1¢
1¢

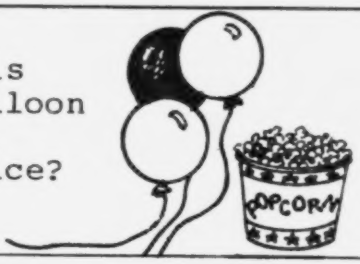
$$\begin{array}{r} \$5.65 \\ -\ 2.13 \\ \hline \$3.52 \end{array} \qquad \text{check} \quad \begin{array}{r} \$3.52 \\ +\ 2.13 \\ \hline \$5.65 \end{array}$$


$1
$1
$1
$1
10¢
10¢
10¢
10¢
10¢
1¢
1¢
1¢
1¢
1¢
1¢
1¢
1¢


$1
$1
$1
$1
$1
$1
$1
10¢
10¢
10¢
10¢
1¢
1¢
1¢
1¢

Solve each problem and check your answer.

A bucket of popcorn sells for $2.75. A circus balloon sells for $1.25. What is the difference in price?



Veronica had $9.99. She bought a clown doll for $4.36. How much money did she have left?

Unit 22

3.02.03 ADDITION OF 3-DIGIT NUMBERS WITH ONE REGROUPING (EXCHANGE) ONES TO TENS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.02.03.01A add two 3-digit numbers with one regrouping (exchange) ones to tens and check;

e.g.,

$$\begin{array}{r} 4\overset{1}{2}3 \\ +168 \\ \hline 591 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 1\overset{1}{6}8 \\ +423 \\ \hline 591 \end{array}$$

3.02.03.02A solve word problems related to skills learned in this module.

e.g.,

Ann and Mike collected 384 baseball cards. Louise collected 106 cards. They decided to combine their collection of baseball cards. How many cards did they have in all?

3.02.03

VOCABULARY

TERMS

regrouping
renaming

GETTING STARTED 1:

Prepare a pack of numeral cards and a pack of matching renamed number cards.

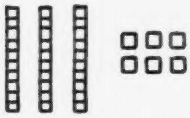
e.g.,

36 | 2 tens 16 ones
43 | 3 tens 13 ones

Using squared material, model one of the numbers.

e.g.,

36



Say, "Who can rename the number by showing it another way?" Elicit responses which lead the students to recognize how 36 may be shown as 2 tens and 16 ones. Ask a student to find the matching renamed number in the pack.

e.g.,

36 = 2 tens 16 ones

Say, "Does the value of a number change when it is renamed? Explain. (No, the value of the number is the same. It is grouped into different parts.) How is 65 grouped into parts by place value? (65 = 6 tens and 5 ones.) How does 5 tens and 15 ones compare to 65? (They both have the same value.) Can you use money to explain that another way?" (Yes, if you have 5 dimes and 15 pennies in one hand and 6 dimes and 5 pennies in the other hand, the value of the money in each hand is the same altough the number of coins is different.)

3.02.03

GETTING STARTED 2:

Present an addition example with 3-digit addends in horizontal format.

e.g.,

$$453 + 245 = \square$$

Ask a student to rewrite the example in vertical format and add.

e.g.,

$$453 + 245 = \square \qquad \begin{array}{r} 453 \\ +245 \\ \hline 698 \end{array}$$

Say, "What must we remember when an example is rewritten vertically?" (When rewriting an example vertically, we must remember to place the ones in the ones column, the tens in the tens column, and the hundreds in the hundreds column.) What will happen if the numbers are placed in the wrong column?" (When the numbers are added, the sum will be incorrect because the value of the addends is incorrect.)

Ask a student to rewrite 453 + 245 in vertical format, but to switch the addends and add.

e.g.,

$$453 + 245 = \square \qquad \begin{array}{r} 453 \\ +245 \\ \hline 698 \end{array}$$

Say, "What happened when we switched the addends?" (The answer was the same because addition is commutative. The order of the addends does not affect the sum).

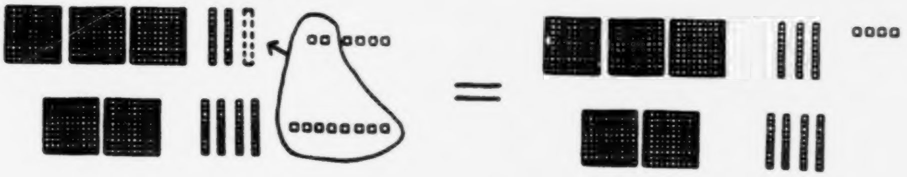
3.02.03.01 **add two 3-digit numbers with one regrouping (exchange) ones to tens and check**

STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. On the chalkboard write

$$\begin{array}{r} 326. \\ \underline{+248} \end{array}$$

Say, "In which column do we begin to add?" (We begin to add in the ones column.) Ask a student to come to the chalkboard and add 6 ones and 8 ones. Say, "How many ones are there? (There are 14 ones.) What is the greatest number of ones that may be written in the ones column? (The greatest number of ones that may be written in the ones column is 9.) How can we use the squared material to regroup 14 as 1 ten and 4 ones? (We can exchange 10 ones for 1 ten.) How is this shown in the example?" (We rewrite 14 as 1 ten and 4 ones by writing a 1 above the 2 in the tens column and writing 4 as a partial sum in the ones column.)

e.g.,



$$\begin{array}{r} 3\overset{1}{2}6 \\ +248 \\ \hline 4 \end{array}$$

Say, "Complete the addition, e.g.,

$$\begin{array}{r} 3\overset{1}{2}6. \\ +248 \\ \hline 574 \end{array}$$

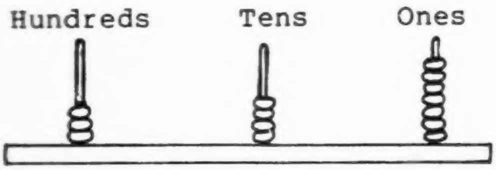
What will happen if we switch the order of the addends? (The answer will be the same because addition is commutative. The order of the addends does not affect the sum.) How can you be certain that your answer is correct?" (By reversing the order of the addends, I was able to check my answer.)

STRATEGY 2: Prepare and display an abacus. Say, "Each column on the abacus has a value: hundreds, tens, or ones." Place 3 blue discs on the hundreds place, 4 red discs on the tens place, and 7 white discs on the ones place.

STRATEGY 2: cont'd

Ask a student to come to the chalkboard and write the number shown on the abacus.

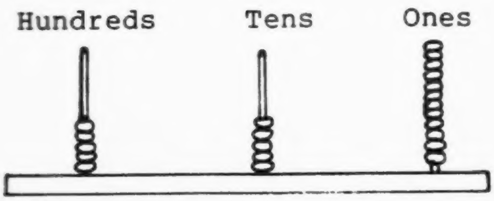
e.g.,



347

Place 2 more hundreds, 1 more ten, and 5 more ones on the abacus. Ask a student to come to the chalkboard and write 215 under the 347.

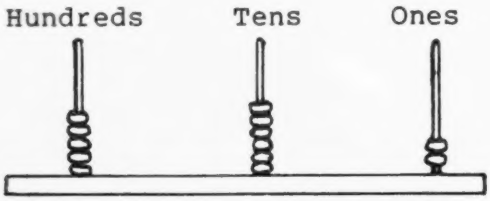
e.g.,



$$\begin{array}{r} 347 \\ +215 \\ \hline \end{array}$$

Say, "In which column of the abacus are there too many beads? (There are too many beads in the ones column.) Why? (There can be only 1 digit in each column. 12 is a 2-digit number.) How can we change this?" (We can rename 12 white ones as 1 red ten and 2 white ones. We can leave the 2 white ones in the ones place and put the 1 red ten in the tens place. We leave the hundreds place as is.) Ask a student to make the appropriate changes on the abacus and to complete the example at the chalkboard. Show the exchange in the example.

e.g.,



$$\begin{array}{r} 3\overset{1}{4}7 \\ +215 \\ \hline 562 \end{array}$$

Say, "How can we check our addition?" (We can check our addition by reversing the addends.) Ask a student to check the example by reversing the addends and then adding. As he/she adds, reinforce the regrouping of 10 ones as 1 ten.

Repeat this procedure with other examples.

3.02.03.01

3.02.03.02 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following problem on the chalkboard:

> Jan is a third-grader whose hobby is stamp collecting. In 1984, he collected 248 stamps. In 1985 he collected 135 stamps. How many stamps did he collect in all during the two years?

Ask the students to read the problem and then restate it in their own words. Say, "What do we want to find out? (We want to find out how many stamps Jan collected.) What information is given to help solve this problem? (We know Jan collected 248 stamps in one year and 135 stamps in another year.) Are there any numbers in the problem which are not needed to solve it?" (We do not need to use the numbers for the years, 1984 and 1985). Ask a student to come to the chalkboard to solve the problem and explain the procedure while the other students work at their desks.

e.g.,

$$\begin{array}{r} 248 \\ +135 \\ \hline 383 \end{array}$$

383 stamps were collected by Jan

Say, "What operation did we use to solve the problem? (We solved it by using addition.) In which place did we begin to add? (We began to add in the ones column.) Why is it necessary to regroup (exchange) to solve the problem? (It is necessary to regroup because 8 ones and 5 ones equal 13. 9 is the greatest number which may appear in any column. Therefore, 13 must be regrouped as 1 ten and 3 ones.) How many stamps did Jan collect in 1984 and 1985?" (Jan collected 383 stamps.)

Repeat this procedure with other story problems.

P.O. 3.02.03.01-.02

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Draw a smile on the face ☺ if you need to regroup or exchange.
Solve each problem and check your work. ☑

solve

$$\begin{array}{r} 236 \\ +127 \\ \hline 363 \end{array}$$

check

$$\begin{array}{r} 127 \\ +236 \\ \hline 363 \end{array}$$

☑

solve

$$\begin{array}{r} 158 \\ +224 \\ \hline \end{array}$$

check

☐

solve

$$\begin{array}{r} 615 \\ +148 \\ \hline \end{array}$$

check

☐

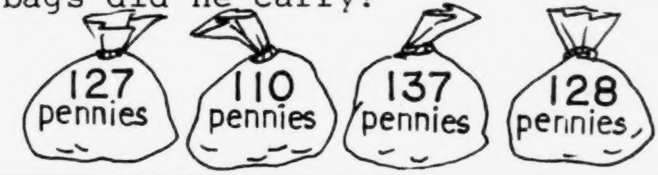
solve

$$\begin{array}{r} 234 \\ +132 \\ \hline \end{array}$$

check

☐

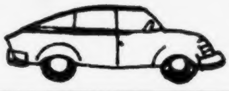
Peppy owns the pizza store. He carried two bags containing 265 pennies to the bank. Which two bags did he carry?



solve **check**

☐

The first day of vacation Mr. Walker drove the family car 127 miles. The next day Mrs. Walker drove the car 136 miles. How far did they travel altogether?

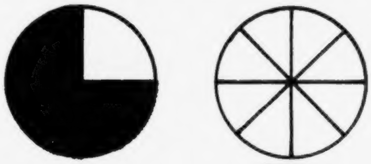


solve **check**

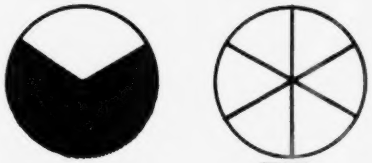
☐

Do you remember?

Color the fractional equivalent and complete the fraction.



$$\frac{3}{4} = \frac{\square}{8}$$



$$\frac{2}{3} = \frac{\square}{6}$$

Unit 23

3.03.02 SUBTRACTION OF 2-DIGIT NUMBERS WITH REGROUPING (EXCHANGE) TENS TO ONES

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.03.02.01A subtract a 2-digit number from a 2-digit number with regrouping (exchange) using expanded notation;
e.g.,

$$\begin{array}{rcrcrcrcr} 42 & = & 40 & + & 2 & = & 30 & + & 12 \\ \underline{-26} & = & \underline{-(20} & \underline{+} & \underline{6)} & = & \underline{-(20} & \underline{+} & \underline{6)} \\ & & & & & = & 10 & + & 6 \\ & & & & & = & \multicolumn{3}{c}{16} \end{array}$$

3.03.02.02A subtract a 2-digit number from a 2-digit number with regrouping (exchange) tens to ones and check;
e.g.,

$$\begin{array}{r} \\ \overset{3}{\cancel{4}}\overset{15}{\cancel{5}} \\ \underline{-\ 28} \\ 17 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ \overset{1}{2}8 \\ \underline{+\ 17} \\ 45 \end{array}$$

*3.03.02.03A subtract money through 99¢ and check;
e.g.,

$$\begin{array}{r} \\ \overset{3}{\cancel{4}}\overset{13}{\cancel{3}}¢ \\ \underline{-\ 28}¢ \\ 15¢ \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ \overset{1}{2}8¢ \\ \underline{+\ 15}¢ \\ 43¢ \end{array}$$

3.03.02.04A solve word problems related to skills learned in this module.

e.g.,

> Joel had 54 baseball cards. He gave Bob 19 cards. How many cards did Joel have left?

VOCABULARY

TERMS

regrouping exchange	expanded notation

GETTING STARTED 1:

Prepare squared material and three groups of cards. Several cards in each group should show money values.

e.g.,

A	53	42¢	24¢	36¢	34	46
B	50 + 3	40¢ + 2¢	20¢ + 4¢	30¢ + 6¢	30 + 4	40 + 6
C	40 + 13	30¢ + 12¢	10¢ + 14¢	20¢ + 16¢	20 + 14	30 + 16

Display group A and ask a student to read each card. Shuffle group B and display the cards. Ask a student to match the cards in group B to the cards in group A.

e.g.,

$$\underset{A}{\boxed{53}} = \underset{B}{\boxed{50 + 3}}$$

Say, "Why did you match 53 with 50 plus 3?" (50 + 3 is 53 in expanded form.) Shuffle the cards from group C and display them. Ask a student to match one of these cards to the appropriate cards in groups A and B.

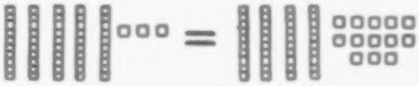
e.g.,

$$\underset{A}{\boxed{53}} = \underset{B}{\boxed{50 + 3}} = \underset{C}{\boxed{40 + 13}}$$

Say, Why did you match 53 with 50 plus 3 and with 40 plus 13?" (The card from group C shows 53 regrouped another way. 40 + 13 shows that one of the tens was regrouped or exchanged as ten ones.) Ask a student to use squared material to show how 53 can be regrouped as 40 + 13.

e.g.,

$$\boxed{53} = \boxed{50 + 3} = \boxed{40 + 13}$$



Say, "Are there other ways to regroup?" Accept all reasonable responses, e.g., 53 = 30 + 23, 53 = 20 + 20 + 3 . . .

Repeat this procedure with other numbers.

GETTING STARTED 2:

Use the materials in Getting Started 1. Ask a student to come to the chalkboard and display the card which shows 42¢. Say, "What operation would you use to find how much money will be left after you buy a balloon which costs 8¢." (I would subtract.) Ask the students to do this mentally first and then to use the cards from groups B and C to explain the subtraction using regrouping. Elicit the steps needed to perform this subtraction and write them on the chalkboard.

e.g.,

$$\begin{array}{rcrcl} 42\text{¢} & = & 40 + 2 & = & 30 + 12 \\ \underline{-\ 8\text{¢}} & = & \underline{-\qquad 8} & = & \underline{-\ (\qquad 8)} \\ & & & = & \underbrace{30 + 4}_{34} \end{array}$$

Say, "Why is it important to know how to regroup in subtraction? (The ones in the subtrahend may be greater than the ones in the minuend. In this example it was necessary to regroup 1 ten as ten ones by changing 42¢ to 30 + 12.) How did that help you subtract?" (Now, I can subtract 8 from 12.)

Repeat this procedure with other word problems.

3.03.02

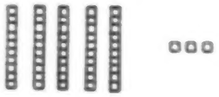
3.03.02.01 **subtract a 2-digit number from a 2-digit number with regrouping (exchange) using expanded notation**

STRATEGY 1: Write the following examples on the chalkboard:

☐	☐	☐	☐	☐
53	76	87	42	63
-28	-32	-51	-14	-27

Say, "Above each example mark a Y for yes if the example requires regrouping, mark an N for no if regrouping is not required. Is it necessary to regroup in the first example?" (Yes, the first example must be regrouped because in the ones place the 8 in the subtrahend is greater than the 3 in the minuend.) Ask a student to use squared material to show 53 and ask another student to come to the chalkboard and write 53 minus 28 in expanded form.

e.g.,



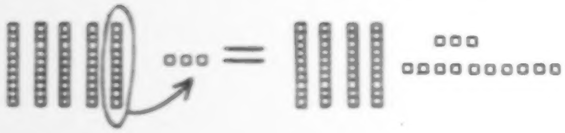
$$\begin{array}{r} 53 \\ \underline{-28} \end{array} \begin{array}{c} = \\ = \end{array} \begin{array}{r} 50 + 3 \\ \underline{-(20 + 8)} \end{array}$$

Say, "Why is there a parentheses around 20 + 8?" (The parentheses tells us to subtract both the 20 and the 8. Without the parentheses, the minus symbol would be meant for the 20 only.)

Say, "How can we subtract 28 from 53?" (It will be necessary to regroup because 8 ones cannot be subtracted from 3 ones. If we exchange 1 ten for 10 ones we then have 13 ones.) Ask a student to show and explain the exchange using squared material.

e.g.,

We can take 1 ten from 50. Now there are 4 tens or 40. The ten we take can be exchanged for 10 ones. These 10 ones can be added to the 3 ones. We will then have 13 ones. Ask a student to demonstrate at the chalkboard.

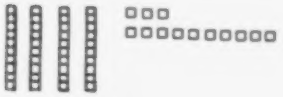


$$\begin{array}{r} 53 \\ \underline{-28} \end{array} \begin{array}{c} = \\ = \end{array} \begin{array}{r} 50 + 3 \\ \underline{-(20 + 8)} \end{array} \begin{array}{c} = \\ = \end{array} \begin{array}{r} 40 + 13 \\ \underline{-(20 + 8)} \end{array}$$

STRATEGY 1: cont'd

Say, "Now we can subtract 28 from 53." Ask a student to demonstrate the subtraction with the squared material and in the example.

e.g.,



$$\begin{array}{rcrcr} 53 & = & 50 + 3 & = & 40 + 13 \\ \underline{-28} & = & \underline{-(20 + 8)} & = & \underline{-(20 + \ 8)} \\ & & & & 20 + \ 5 \\ & & & = & 25 \end{array}$$

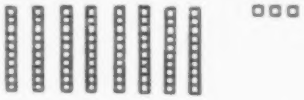
Continue to subtract in the tens column. Say, "How does expanding and regrouping help you in subtraction?" (You see that a number which has been expanded and regrouped has the same value as the original number. You can then do the subtraction.)

STRATEGY 2:

On the chalkboard write $\begin{array}{r} 83. \\ \underline{-27} \end{array}$ Say, "When we subtract, which number(s) do we model by using squared material? (We model the top number.) What is the top number called?" (The top number in a subtraction example is the minuend.) Ask a student to model 83 using squared material.

e.g.,

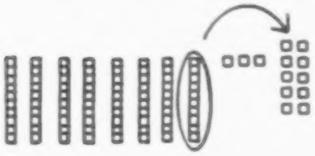
$$\begin{array}{r} 83 \\ \underline{-\ 27} \end{array}$$



Demonstrate at the chalkboard that you are showing 8 tens (80) and 3 ones (3), e.g., 80 + 3. Say, "How can we subtract 27 from 83?" (You can't take 7 ones away because there are only 3 ones in the minuend.) It is necessary to regroup (exchange) 1 ten for 10 ones.) Demonstrate that procedure in both the algorithm and in the model.

e.g.,

Exchange 1 ten for 10 ones.



$$\begin{array}{rcrcr} 83 & = & 80 \quad + 3 & = & 70 + 13 \\ \underline{-27} & = & \underline{-(20 \quad + 7)} & = & \underline{-(20 + \ 7)} \\ & & & & 50 + \ 6 \\ & & & = & 56 \end{array}$$

STRATEGY 2: cont'd

Say, "Can you take 7 ones from 13 ones?" (Yes.) Ask a student to come to the chalkboard to complete the subtraction in the tens column and to use the squared material to demonstrate. Say, "How does the answer using the squared material compare with the answer in the written example and in the expanded format? (They are the same.) Why did we use the squared material?" (It helped us see the regrouping.)

Repeat this procedure using other examples.

3.03.02.02 **subtract a 2-digit number from a 2-digit number with regrouping (exchange) tens to ones and check**

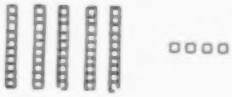
STRATEGY 1: Write four examples on the chalkboard.

e.g.,

$$A\ \begin{array}{r} 28 \\ \underline{-16} \end{array} \qquad B\ \begin{array}{r} 43 \\ \underline{-11} \end{array} \qquad C\ \begin{array}{r} 54 \\ \underline{-26} \end{array} \qquad D\ \begin{array}{r} 67 \\ \underline{-34} \end{array}$$

Say, "In what way is example C different than the other examples?" (It is the only one in which you must regroup in order to subtract. You must exchange 1 ten for 10 ones.) Rewrite the example at the chalkboard and ask a student to model it using squared material.

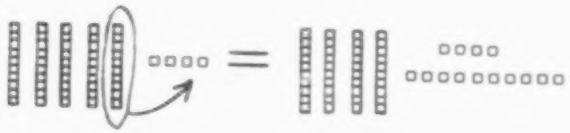
e.g.,



$$\begin{array}{r} 54 \\ \underline{-26} \end{array}$$

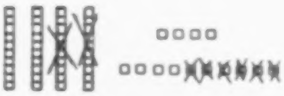
Ask a student to show how to regroup (exchange) one ten for ten ones and to subtract using the squared material.

e.g.,



$$\begin{array}{r} 54 \\ \underline{-26} \end{array}$$

Now we can subtract 26 from 54.



$$\begin{array}{r} 54 \\ \underline{-26} \end{array}$$

STRATEGY 1: cont'd

Say, "How many tens and ones are left in the model? (2 tens and 8 ones are left.) What do 2 tens and 8 ones equal?" (2 tens and 8 ones equal 28.) Ask the students to explain the procedure needed to perform the subtraction and to write the numerical work corresponding to each step in the procedure.

e.g.,

$$\begin{array}{r} {\scriptstyle 4\,14} \\ \cancel{5}\cancel{4} \\ -26 \\ \hline 28 \end{array}$$

Say, "How can we check the answer?" (We can check the answer by adding the difference, 28 and the subtrahend, 26. If the sum is equal to the minuend in the original subtraction example, we have subtracted correctly.)

e.g.,

$$\begin{array}{r} {\scriptstyle 4\,14} \\ \cancel{5}\cancel{4} \\ -26 \\ \hline 28 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ {\scriptstyle 1} \\ 28 \\ +26 \\ \hline 54 \end{array}$$

STRATEGY 2: Prepare a set of cards which shows the written sequence for subtracting 19 from 54.

e.g.,

A	B	C	D	E	F
$\begin{array}{r} 54 \\ -19 \\ \hline \end{array}$	$\begin{array}{r} \cancel{5}\cancel{4} \\ -19 \\ \hline \end{array}$	$\begin{array}{r} \cancel{5}\cancel{4} \\ -19 \\ \hline \end{array}$	$\begin{array}{r} {\scriptstyle 4\,14} \\ \cancel{5}\cancel{4} \\ -19 \\ \hline 5 \end{array}$	$\begin{array}{r} {\scriptstyle 4\,14} \\ \cancel{5}\cancel{4} \\ -19 \\ \hline 35 \end{array}$	$\begin{array}{r} {\scriptstyle 1} \\ 35 \\ +19 \\ \hline 54 \end{array}$

Shuffle the cards. Ask a student to arrange the shuffled cards on the chalkboard ledge in the sequence used for completing the subtraction. Ask the students to verbalize and to write a sentence about each card.

e.g.,

A. You want to subtract 19 from 54.

B. You can't subtract 9 ones from 4 ones. You must regroup (exchange) 1 ten for ten ones.

C. 54 has the same value as 4 tens and 14 ones.

3.03.02

STRATEGY 2: cont'd

D. You can subtract 9 ones from 14 ones; 14 - 9 = 5.

E. You can subtract 1 ten from 4 tens. Therefore, 54 minus 19 equals 35.

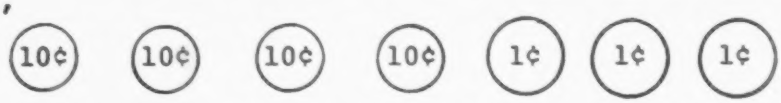
F. To check your work you add the answer (difference) to the subtrahend.

Say, "Look at card A. Which number would you use to model this subtraction with squared material? (54) Which card(s) show how to exchange 1 ten for 10 ones? (Cards B and C.) Why was it necessary to exchange? (You cannot subtract 9 ones from 4 ones.) Which card shows the difference between 54 and 19?" (Card E.)

3.03.02.03 **subtract money through 99¢ and check**

STRATEGY 1: Prepare and display play money (dimes and pennies).

e.g.,



Prepare a sample chart on the chalkboard and ask a student to write the number of coins displayed in the appropriate columns.

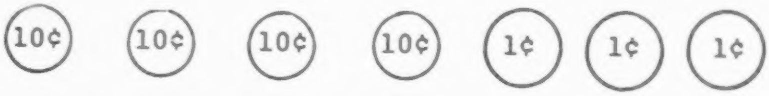
e.g.,

Dimes	Pennies
4	3

Say, "How much money is displayed and shown on the chart? (43¢ is displayed.) Danny has 43¢. He buys a pencil for 15¢. How much money does he now have?" Ask a student to write an example next to the coins which describes this story.

e.g.,

```
 43¢
-15¢
```



Say, "How can we solve this problem? (We can subtract.) What clues help us determine that subtraction is the correct operation?" (If Danny spends some of his money, he will have less money

STRATEGY 1: cont'd

than with what he started.) Ask a student to use the coins to show the subtraction. Say, "How can we take 15¢ from the coins displayed? (We can exchange 1 dime for 10 pennies. Then we will have 13 pennies and 3 dimes. If we take away 1 dime and 5 pennies, we will subtract correctly.) How can we do the subtraction without the money?" (We can exchange 1 ten for 10 ones and then subtract.) Ask a student to demonstrate the problem at the chalkboard.

e.g.,

$$\begin{array}{r} \overset{3}{\cancel{4}}\overset{13}{\cancel{3}}\text{¢} \\ -15\text{¢} \\ \hline 28\text{¢} \end{array}$$

Say, "When we subtract money, what must be shown in the difference? (The cent sign or the dollars and cent signs must be shown in the difference.) What is the answer to the problem? (Danny has 28¢ left.) How can we check our arithmetic to determine if it is correct?" (One way is to add the subtrahend and the difference to find the minuend. Addition and subtraction are inverse operations and can be used to check each other.) Use related facts from the fact families to show this and then check the example.

e.g.,

$$\begin{array}{rcr} & & \underline{\text{check}} \\ \overset{3}{\cancel{4}}\overset{13}{\cancel{3}}\text{¢} & \quad & \overset{1}{2}8\text{¢} \\ -15\text{¢} & & +15\text{¢} \\ \hline 28\text{¢} & & 43\text{¢} \end{array}$$

STRATEGY 2: Write the following examples on the chalkboard:

$$\begin{array}{cccc} \text{A} & \text{B} & \text{C} & \text{D} \\ \begin{array}{r} 56\text{¢} \\ \underline{-12\text{¢}} \end{array} & \begin{array}{r} 48\text{¢} \\ \underline{-39\text{¢}} \end{array} & \begin{array}{r} 62\text{¢} \\ \underline{-37\text{¢}} \end{array} & \begin{array}{r} 78\text{¢} \\ \underline{-35\text{¢}} \end{array} \end{array}$$

Say, "When we subtract money, what must we always show in the answer?" (We must always show the symbols for money.) Ask a student to write the symbols for money on the chalkboard and to define each symbol, e.g., ¢ and $.

STRATEGY 2: cont'd

Say, "When is it necessary to regroup (exchange)? (It is necessary to regroup (exchange) when you compare the digits in the ones place and the number in the subtrahend is greater than the number in the minuend. Look at the examples on the chalkboard. In which examples was it necessary to regroup?" (Regrouping was necessary in examples B and C.) Ask a student to demonstrate at the chalkboard the regroupings in examples B and C.

e.g.,

$$\begin{array}{r} {\scriptstyle 3\;18} \\ \cancel{4}\cancel{8}\text{¢} \\ -39 \\ \hline 9\text{¢} \end{array} \qquad\qquad \begin{array}{r} {\scriptstyle 5\;12} \\ \cancel{6}\cancel{2}\text{¢} \\ -37 \\ \hline 25\text{¢} \end{array}$$

Say, "Why didn't we regroup in examples A and D?" (Regrouping wasn't necessary because there are fewer ones in the subtrahend than in the minuend in both examples.)

3.03.02.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Write a word problem on the chalkboard and ask a student to read it.

e.g.,

> Reggie saved 59¢. He wants to purchase a book which costs 78¢. How much more money does he need to purchase the book?

Say, "How do you know what operation to use to solve this problem?" Accept any reasonable response.

e.g.,

- The question in the problem suggests a comparison. Comparisons usually indicate subtraction.

STRATEGY 1: cont'd

- If Reggie needs more money to purchase the book, we can say he is missing some money. Therefore a number sentence with a missing addend is appropriate.

Ask a student to write a subtraction example to solve this problem on the chalkboard, e.g., $\begin{array}{r} 78¢ \\ \underline{-59¢} \end{array}$.

Say, "Explain if it is necessary to regroup." (In the ones column the digit in the subtrahend is less than the digit in the minuend. Therefore, you must regroup.) Ask a student to demonstrate the regrouping and to complete the subtraction and explain the steps needed to perform the subtraction.

e.g.,

$$\begin{array}{rl} \overset{6}{\cancel{7}}\overset{18}{\cancel{8}}¢ & \text{cost of book} \\ \underline{-59¢} & \text{amount of money saved} \\ 19¢ & \text{amount of money needed to buy the book} \end{array}$$

Say, "What is the answer to the problem? (Reggie needs 19¢ more to purchase the book.) Explain why the answer makes sense. (19¢ is less than the original cost of the book. Since 59¢ has already been saved, 19¢ makes sense.) How can you check the answer?" (Add the amount of money needed, 19¢ to the amount of money saved, 59¢. This should equal the cost of the book, 78¢.)

STRATEGY 2: Prepare and display a chart.

e.g.,

	GAMES		
TEAM	WON	LOST	PLAYED
METS	18		32

Say, "This chart has information about the METS. What information is given about the number of games they won? (They won 18 games.) How many games were played? (They played 32 games.) What information is missing? (The number of games lost is missing.) How

STRATEGY 2: cont'd

can we use the information given to find out how many games were lost?" (We can subtract 18 from 32.) Ask a student to write the example on the chalkboard.

e.g.,

$$\begin{array}{rl} 32 & \text{games played} \\ \underline{-18} & \text{games won} \\ & \text{games lost} \end{array}$$

Say, "Can you take 8 ones from 2 ones?" (No, it is necessary to regroup (exchange) because in the ones place the 8 is greater than the 2.) Ask a student to demonstrate how to regroup (exchange) to complete the subtraction and to explain the steps needed to perform the subtraction.

e.g.,

$$\begin{array}{rl} \overset{2}{\cancel{3}}\overset{1}{}\!\!\cancel{2} & \text{games played} \\ -18 & \text{games won} \\ \hline 14 & \text{games lost} \end{array}$$

Say, "What is the answer to the problem? (The Mets lost 14 games.) How can we be sure the answer is correct?" (We can check our work.) Demonstrate.

e.g.,

$$\begin{array}{rl} \overset{2}{\cancel{3}}\overset{1}{}\!\!\cancel{2} & \text{games played} \\ -18 & \text{games won} \\ \hline 14 & \text{games lost} \end{array} \qquad \begin{array}{rl} & \underline{\text{check}} \\ \overset{1}{1}8 & \text{games won} \\ +14 & \text{games lost} \\ \hline 32 & \text{games played} \end{array}$$

Add the names of other teams to the chart to compute their win - loss records.

P.O. 3.03.02.01-.02

NAME: ______________________ **CLASS:** ________ **DATE:** ________

Find the missing numbers. Complete the examples by filling in the ☐ with the correct number.

$$\begin{array}{rcccl} 63 & = & \boxed{60} + 3 & = & 50 + \boxed{} \\ -\ 47 & = & -(\,40 + \boxed{}\,) & = & -(\,40 + \boxed{}\,) \\ \hline & & & = & \underbrace{10 + 6}_{\boxed{}} \end{array}$$

$$\begin{array}{rcccl} 82 & = & 80 + \boxed{} & = & \boxed{} + 12 \\ -\ 35 & = & -(\,\boxed{} + 5\,) & = & -(\,30 + \boxed{}\,) \\ \hline & & & = & \underbrace{\boxed{} + 7}_{\boxed{}} \end{array}$$

Subtract and check.

subtract	check	subtract	check
$\begin{array}{r}\overset{6}{\cancel{7}}\overset{12}{\cancel{2}}\\ -\ 39\\ \hline 33\end{array}$	$\begin{array}{r}39\\ +\ 33\\ \hline 72\end{array}$	$\begin{array}{r}83\\ -\ 57\\ \hline \end{array}$	

subtract	check	subtract	check
$\begin{array}{r}51\\ -\ 17\\ \hline \end{array}$		$\begin{array}{r}46\\ -\ 28\\ \hline \end{array}$	

P.O. 3.03.02.02-.04

NAME: ________________ **CLASS:** ________ **DATE:** ________

Solve and check the examples below.
Did you regroup? Write Y for yes if you regrouped.
Write N for no if you did not regroup.

Y 8 11 ~~91~~ - 38 53 **check** 38 + 53 91	☐ 47 - 26 **check**	☐ 53 - 18 **check**
☐ 84 - 37 **check**	☐ 62 - 40 **check**	☐ 80 - 27 **check**

Find each error. Redo and check each example.

Ⓐ 52¢ - 16¢ 68¢ X	Ⓑ 71¢ - 24¢ 53¢ X	Ⓒ 5 17 ~~67¢~~ - 21¢ 316¢ X
check 52¢ - 16¢	**check**	**check**

Which number sentence would you use to solve this problem?

Max had 85¢. He bought an 8 ounce box of raisins for 69¢. How much money does he have left?

ⓐ 85¢ + 69¢ = ☐ ⓒ 85¢ - 69¢ = ☐
ⓑ 69 - 8 = ☐ ⓓ 69 + 8 = ☐

Complete by filling in the missing information.

ATTENDANCE			
	Boys	Girls	Total
Monday	17	☐	32
Tuesday	☐	19	28
Wednesday	17	☐	31
Thursday	☐	19	27
Friday	15	☐	30

SHARPENING YOUR SKILLS

Units 21, 22, 23

Name: ______________________ **Class:** __________ **Date:** __________

Use the table below to answer questions 1, 2, and 3.

Item	Cost
pencil	$ .42
notebook	$1.23
ruler	$ .91
bookbag	$5.20

1. How much do the bookbag and the notebook cost together?

____

2. David has $9.95. He bought the bookbag and the notebook. How much money does he have left?

____

3. How much more does the ruler cost than the pencil?

____

4.

$$\begin{array}{r} 84\text{¢} \\ \underline{-37\text{¢}} \end{array}$$

47	53¢	47¢	57
ⓐ	ⓑ	ⓒ	ⓓ

5. solve check

$$\begin{array}{r} 261 \\ \underline{+384} \end{array}$$

P.S. 321 has 72 classrooms.
P.S. 41 has 36 classrooms.

6. How many more classrooms are in P.S. 321 than in P.S. 41?

____

7. If 15 classrooms are closed in P.S. 321 how many classrooms are open?

______ classrooms are open.

8. Match the expanded subtraction to a standard subtraction.

$$\begin{array}{rcr} 90 + 2 & = & 80 + 12 \\ \underline{-(30 + 8)} & = & \underline{-(30 + 8)} \\ & & 50 + 4 \\ & & 54 \end{array}$$

$$\begin{array}{cccc} \begin{array}{r} 92 \\ \underline{-38} \end{array} & \begin{array}{r} 902 \\ \underline{-308} \end{array} & \begin{array}{r} 82 \\ \underline{-48} \end{array} & \begin{array}{r} 83 \\ \underline{-29} \end{array} \end{array}$$

ⓔ	ⓕ	ⓖ	ⓗ

9. Peter has $8.21. If he earns $1.42, how much money will he have?

ⓐ $9.23

ⓑ $7.21

ⓒ $9.63

ⓓ $8.63

Unit 24

3.03.03 SUBTRACTION OF 3-DIGIT NUMBERS WITH REGROUPING (EXCHANGE) TENS TO ONES

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.03.03.01A subtract a 1-digit number from a 3-digit number with one regrouping (exchange) tens to ones and check;
e.g.,

$$\begin{array}{r} 3\overset{6}{\cancel{7}}\overset{13}{\cancel{3}} \\ -\quad 9 \\ \hline 364 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 3\overset{1}{6}4 \\ +\quad 9 \\ \hline 373 \end{array}$$

3.03.03.02A subtract a 2-digit number from a 3-digit number with one regrouping (exchange) tens to ones and check;
e.g.,

$$\begin{array}{r} 4\overset{1}{\cancel{2}}\overset{15}{\cancel{5}} \\ -\ 16 \\ \hline 409 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 4\overset{1}{0}9 \\ +\ 16 \\ \hline 425 \end{array}$$

3.03.03.03B subtract a 3-digit number from a 3-digit number with one regrouping (exchange) tens to ones and check;
e.g.,

$$\begin{array}{r} 8\overset{0}{\cancel{1}}\overset{13}{\cancel{3}} \\ -205 \\ \hline 608 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ 6\overset{1}{0}8 \\ +205 \\ \hline 813 \end{array}$$

3.03.03.04B solve word problems related to skills learned in this module.

e.g.,

Bill needs 194 marbles for his collection. He now has 15 marbles. How many more does he need?

3.03.03

VOCABULARY

TERMS

regrouping
renaming
subtrahend
minuend
difference

GETTING STARTED 1:

Say, "Joey had 26¢ in his piggy bank. He spent 8¢. How much money did he have left? What do we want to find out in this problem? (How much money did Joey have left?) How can we find out how much money Joey had left?" (We must subtract.) Ask a student to write the example on the chalkboard.

e.g.,

$$\begin{array}{r} 26\text{¢} \\ \underline{-8\text{¢}} \end{array}$$

Say, "Can we subtract 8 from 6? Explain. (We cannot subtract 8 from 6 because 8 is greater than 6.) What must we do?" (We must exchange 1 ten for 10 ones.) Demonstrate at the chalkboard.

e.g.,

$$\begin{array}{r} \overset{1}{\cancel{2}}\overset{16}{\cancel{6}}\text{¢} \\ \underline{-8\text{¢}} \\ 18\text{¢} \end{array}$$

Say, "How many ones do we now have? (We have 16 ones.) How many tens do we now have? (We have 1 ten.) How much money does Joey have left? (Joey has 18¢ left.) How did we complete the subtraction?" (We had to exchange 1 ten for 10 ones or 1 dime for 10 pennies.)

Repeat this procedure using other examples.

GETTING STARTED 2:

Prepare and display 3 sets of cards, each with a different name for the same numeral written on it.

GETTING STARTED 2: cont'd

e.g.,

35	3 tens + 5 ones	2 tens + 15 ones

Say, "Today we will play a game to review some different names that a number can have." Display a numeral card, e.g., 35. Ask the students to identify the number and to rename it in expanded notation. Say, "Recognizing that a number can have different names will help you to complete subtraction examples which require exchange or regrouping."

Divide the students into two teams. Say, "One member of each team will select a numeral card. Two other members of the same team must choose other cards which represent different names for that numeral. If they are correct the team will score a point."

Continue the game until all the cards have been used.

3.03.03

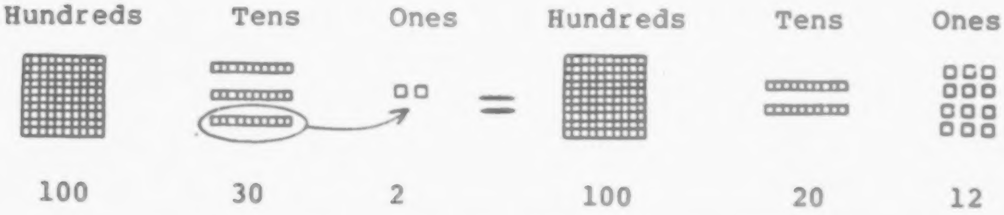
3.03.03.01 **subtract a 1-digit number from a 3-digit number with one regrouping (exchange) tens to ones and check**

STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Say, "When we tried to subtract 8¢ from 26¢ we needed to exchange 1 ten for 10 ones. Why did we make this exchange? (We exchanged 1 ten for 10 ones because there were not enough ones.) Today we will work with 3-digit numbers. We will subtract a 1-digit number from a 3-digit number." Write the following example on the chalkboard:

$$\begin{array}{r} 132. \\ \underline{-6} \end{array}$$

Ask a student to read the example. Say, "Use your squared material to represent each number as I demonstrate at the chalkboard. Can we take 6 ones away from the 2 ones in 132? (No, we cannot take 6 ones away from 2 ones in 132.) Why? (6 ones are more than 2 ones.) What must we do?" (We must exchange 1 ten for 10 ones). Ask the students to exchange their squared material as you demonstrate at the chalkboard.

e.g.,



Say, "How many ones do we now have? (We have 12 ones.) How can we now complete the subtraction?" Elicit the procedure and ask a student to complete the subtraction on the chalkboard.

e.g.,

$$\begin{array}{r} 1\overset{2}{\cancel{3}}\overset{12}{\cancel{2}} \\ \underline{-6} \\ 126 \end{array}$$

Say, "Let's check our answer to see if we are correct. How do we check a subtraction example?" (We

STRATEGY 1: cont'd

add the subtrahend and the difference. If the answer matches the original minuend, we are correct.)

e.g.,

$$\begin{array}{rl} 132 & \text{minuend} \\ -6 & \text{subtrahend} \\ \hline 126 & \text{difference} \end{array} \qquad \begin{array}{rl} \multicolumn{2}{l}{\underline{\text{check}}} \\ +126 & \text{difference} \\ 6 & \text{subtrahend} \\ \hline 132 & \text{minuend} \end{array}$$

Say, "What did we do to complete the subtraction?" (We exchanged 1 ten for 10 ones.)

Repeat this procedure using other examples.

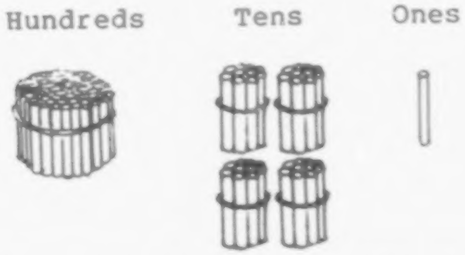
STRATEGY 2: Prepare and display a demonstration set of bundles of straws (hundreds, tens, and ones). Say, "Today we will rename some numbers in order to solve some subtraction examples." Relate the following story problem to the students:

> Robert has 141 baseball cards. He gave 5 cards to his brother. How many does he have left?

Say, "What do we want to find out in this problem? (How many cards does Robert have left?) How will we solve it?" (We can solve it by subtracting.) Ask a student to write the example on the chalkboard, e.g.,

$$\begin{array}{r} 141. \\ -5 \\ \hline \end{array}$$

Ask another student to represent 141 with the straws. e.g.,

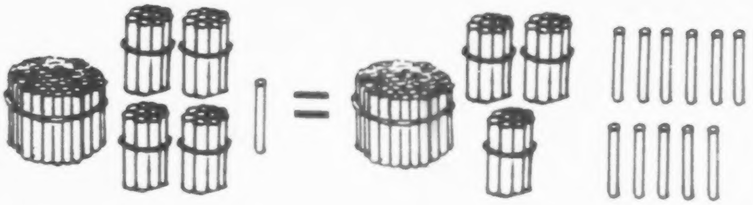


Say, "How can we complete the subtraction?" (We can exchange 1 ten strip for 10 ones, rewrite the example by renaming 1 ten as 10 ones, and subtract.)

3.03.03

STRATEGY 2; cont'd

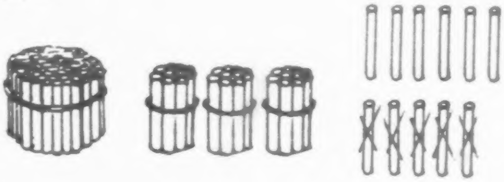
e.g.,



$$\begin{array}{r} {\scriptstyle 3\,11} \\ 1\cancel{4}1 \\ -\quad 5 \\ \hline \end{array}$$

Say, "How many ones do we now have? (We have 11 ones.) How many tens do we now have? (We have 3 tens.) How can we complete the subtraction?" Elicit the procedure.

e.g.,



$$\begin{array}{r} {\scriptstyle 3\,11} \\ 1\cancel{4}1 \\ -\quad 5 \\ \hline 136 \end{array}$$

Ask a student to check the subtraction and to explain the steps.

e.g.,

$$\begin{array}{rl} & \underline{\text{check}} \\ +136 & \text{difference} \\ 5 & \text{subtrahend} \\ \hline 141 & \text{minuend} \end{array}$$

Say, "Why did we rename 141? (We renamed 141 to complete the subtraction.) Which value did we rename?" (We renamed 1 ten as 10 ones.)
Repeat this procedure using other examples.

3.03.03.02 subtract a 2-digit number from a 3-digit number with one regrouping (exchange) tens to ones and check

STRATEGY 1: Adapt Strategies 1 or 2 developed in 3.03.03.01.

3.03.03.03 subtract a 3-digit number from a 3-digit number with one regrouping (exchange), tens to ones, and check

STRATEGY 1: Adapt Strategies 1 or 2 developed in 3.03.03.01.

STRATEGY 2: Prepare and distribute red, white and blue chips (cubes, beads or buttons) to each student or group of students. Draw three columns on the chalkboard and label them R, W, and B while the students do the same in their notebooks.

e.g.,

Hundreds	Tens	Ones
R	W	B

Write 456 on the chalkboard. Ask a student to
-128

represent 456 with the chips and to express their corresponding values.

e.g.,

Hundreds	Tens	Ones
R	W	B
○○○○	○○○○○	●●●●●●
400	50	6

Say, "To subtract 128 from 456 we must exchange 1 ten for ten ones." Ask a student to demonstrate that exchange with the chips.

e.g.,

Hundreds	Tens	Ones
R	W	B
○○○○	○○○○○	●●●●●●

=

Hundreds	Tens	Ones
R	W	B
○○○○	○○○○○	●●●●●● ●●●●●●●●●●

Ask a student to write and solve a subtraction example for this demonstration.

e.g.,

 4 16
4~~5~~6
-128
328

Say, "How did we know that renaming was necessary?" (We did not have enough ones in the ones place.) How did we do this renaming? (We renamed one of the tens as 10

STRATEGY 2: cont'd ones.) How many ones do we now have? (We have 16 ones.) How many tens do we now have?" (We have 4 tens.) Ask a student to come to the chalkboard and check the answer.

e.g.,

$$\begin{array}{rl} \underline{\text{check}} & \\ 3\overset{1}{2}8 & \text{difference} \\ \underline{+128} & \text{subtrahend} \\ 456 & \text{minuend} \end{array}$$

3.03.03.04 **solve word problems related to skills learned in this module.**

STRATEGY 1: Say, "We have been subtracting 1-, 2- and 3-digit numbers from 3-digit numbers. In order to complete each subtraction, what did we have to do?" (We had to rename 1 ten as 10 ones.)

Relate the following story problem to the students:

> Keith's father owns 3 clothing stores. Last week he counted 132 hats in his 3 stores. This week the number of hats was reduced by 6. How many hats does he now have in his stores?

Say, "What do we want to find out in this problem? (How many hats does Keith's father have left?) How do we solve this problem? (We must subtract.) How do we know that we have to subtract? (We know that the number of hats was "reduced".) What information in the story is not needed? (3 clothing stores is not needed.) Which information is needed to solve the problem?" (He had 132 hats. He sold 6 hats.) Ask a student to solve the problem at the chalkboard while the rest of the students work at their desks.

e.g.,

$$\begin{array}{rl} 1\overset{2}{\cancel{3}}\overset{12}{2} & \\ \underline{-\quad 6} & \\ 126 & \text{hats are left in Keith's father's stores.} \end{array}$$

STRATEGY 1: cont'd

Say, "What did we do to complete the subtraction?" (We had to rename 1 ten as 10 ones.) Why?" (6 ones cannot be subtracted from 2 ones.) Repeat this procedure using other story problems to subtract 1-, 2-, and 3-digit numbers from a 3-digit number.

P.O. 3.03.03.01, .02, .04

NAME: ____________________ CLASS: __________ DATE: ________

1. See if you can hit a home run. Solve and check each example.
2. Solve and check each story problem.

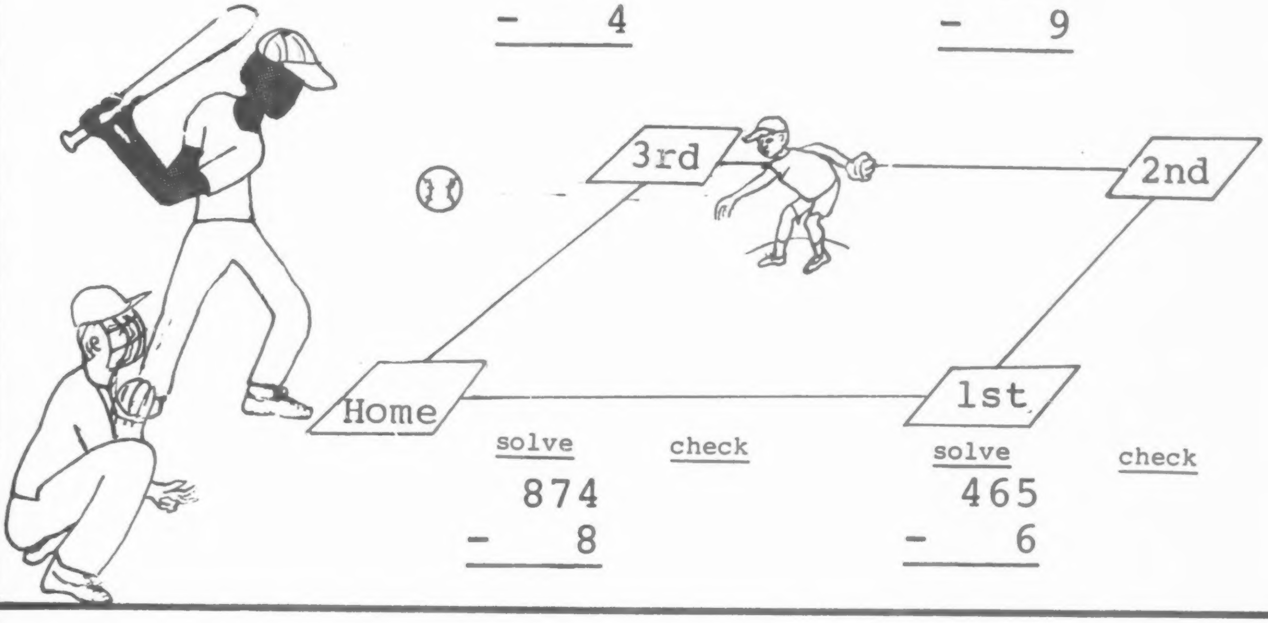
Batter Up

solve check

$$\begin{array}{r} 370 \\ -\quad 4 \\ \hline \end{array}$$

solve check

$$\begin{array}{r} 327 \\ -\quad 9 \\ \hline \end{array}$$



solve check

$$\begin{array}{r} 874 \\ -\quad 8 \\ \hline \end{array}$$

solve check

$$\begin{array}{r} 465 \\ -\quad 6 \\ \hline \end{array}$$

1. Sam has 125 baseball cards. He gave 8 to has brother. How many does he have left?

solve check

Answer: He has 117 baseball cards left.

2. My father drove 291 miles on Monday. On Tuesday he drove 5 miles less. How many miles did he drive on Tuesday?

solve check

Answer: ____________________

3. Max made 196 jelly donuts. He made 48 fewer chocolate donuts. How many chocolate donuts did he make?

solve check

Answer: ____________________

4. A VCR cost $395. A cassette recorder cost $86. What was the difference in price?

solve check

Answer: ____________________

P.O. 3.03.03.03-.04

NAME: ________ CLASS: ________ DATE: ________

1. Solve and check each example.
2. Solve and check each story problem.

Help Sherlock Holmes Solve The Mystery of the Missing Numbers

solve	check	solve	check
267 - 138		\$9.89 - 4.26	
458 - 239		\$6.64 - 5.17	

1. John ran 226 miles last year. His brother ran 117 miles. How many more miles did John run?

solve check

Answer: ________

2. Haydee has 472 pennies in her bank. Her sister has 125 fewer pennies. How many pennies does her sister have?

solve check

Answer: ________

3. Ann's bicycle cost \$358. Maria's bicycle cost \$229. What was the difference in price between the two bicycles?

solve check

Answer: ________

3.01.06 COUNT BY TWOS, THREES, FOURS, FIVES

(1 lesson/ongoing)

PERFORMANCE OBJECTIVES

	The student will be able to...
3.01.06.01A	count by twos forward and backward within the hundreds; e.g., 100, 102, 104, ..., 200 500, 498, 496, ..., 400
3.01.06.02A	count by fives forward and backward within the hundreds; e.g., 400, 405, 410, ..., 500 300, 295, 290, ..., 200
*3.01.06.03A	count by threes forward and backward within the hundreds; e.g., 600, 603, 606, ..., 699 699, 696, 693, ..., 600
*3.01.06.04A	count by fours forward and backward within the hundreds. e.g., 100, 104, 108, ..., 200 200, 196, 192, ..., 100

VOCABULARY

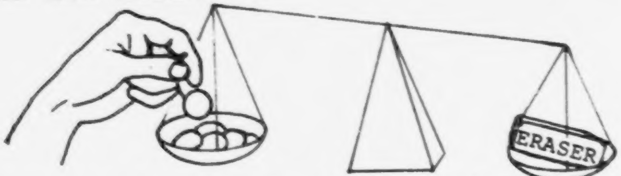
TERMS

forward
backward

GETTING STARTED 1:

Prepare a pan balance, chips, and objects varying in weight (eraser, book). Place one object in one pan of the balance. Ask the students to count the chips and tally the number of chips on the chalkboard as they are placed in the other pan of the balance. Say, "Stop counting when the pans are balanced."

e.g.,



After the pans are balanced, ask the students to count backward as you remove each chip. Say, "How are we counting if the numbers get larger as we count?" (We are counting forward.) As we added chips we counted by ones. How could we have counted faster?" (We could have counted faster by twos or by fives.)

GETTING STARTED 2:

Prepare and distribute to each student scissors, paste, crayons, and an 8 $\frac{1}{2}$" X 14" sheet of paper. Demonstrate as you ask the students to trace the pattern of their hands and color and cut out the patterns. Say, "When I call your name, paste the pattern of your hands on the chalkboard. Write your name below them."

e.g.,

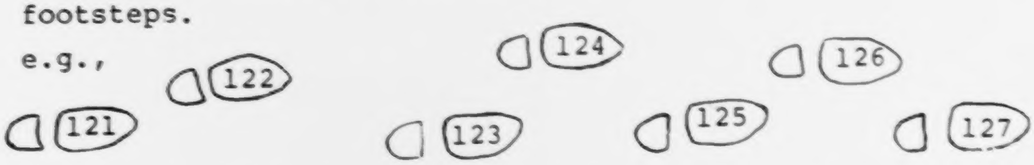
Ask a student to count the pairs of hands on the chalkboard. Say, "Each pair of hands has ten fingers. Let's count by tens to see how many fingers there are in all on the chalkboard." Point to each pair of hands as the students count. Say, "Why do we count by tens here instead of by ones?" (It is faster to count by tens than by ones.)

3.01.06

3.01.06.01 **count by twos forward and backward within the hundreds**

STRATEGY 1: Prepare and display a set of giant numbered footsteps.

e.g.,



Ask the students to count the giant's steps. Say, "How are the left feet (top) the same? (They are all even numbers.) How are the right feet (bottom) the same? (They are all odd numbers.) The giant was in a hurry so he counted only the steps made by his left foot. After the giant reached the 122nd step, what were the next five numbers in his count.? (The next five numbers were 124, 126, 128, 130, 132.) How did you arrive at the answer?" (I selected the next five even numbers or every second number.) Ask a student to come to the chalkboard and write these numbers as the other students record them in their notebooks. Say, "What were the next five numbers after the 312th step? (The next five numbers were 314, 316, 318, 320, 322.) The giant reached the end of his journey at the 500th step. He began to walk backward to return home. What were the first five even numbers in his return trip?" The first five numbers going back home were 500, 498, 496, 494, 492.) Ask a student to write the numbers on the chalkboard as the other students record them in their notebooks.

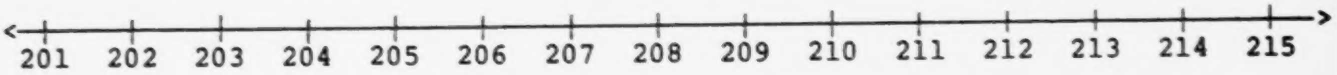
Repeat this procedure for counting forward and backward by twos during various stages of the giant's journey. Say, "What happened to the numbers as the giant walked forward to reach his destination? (The numbers got larger as he walked forward.) What happened to the numbers as the giant walked backward to return home? (The numbers got smaller as he

STRATEGY 1: cont'd walked backward.) How was the giant counting each time he said a number?" (The giant was counting by twos, both forward and backward.)

3.01.06.02 **count by fives forward and backward within the hundreds**

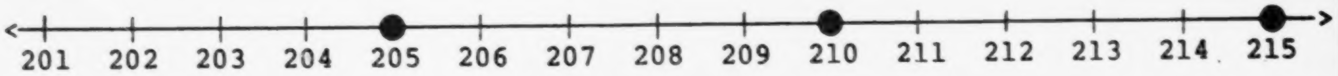
STRATEGY 1: Prepare and display several red discs and a number line which shows the streets along the route of a bus.

e.g.,



Tell a story about Wayne's father who is a bus driver. Say, "We have counted forward and backward by twos. Now we will learn to count forward and backward by fives." Ask a student to come to the chalkboard. Say, "Beginning at 205, place a red disc on the number line every five blocks to show where the traffic lights are located on the route."

e.g.,



Say, "At which streets will Wayne's father find a traffic light?" (Wayne's father will find a traffic light at 205th Street, 210th Street and 215th Street.) Ask the students to say the street numbers as Wayne's father drives uptown (counting forward) and to repeat the procedure as Wayne's father drives downtown (counting backward). Repeat this procedure using other stories and other "streets" on the number line. Use different numbers each time. Ask the students to copy the number lines into their notebooks, placing dots on the number line every five 'blocks'.

3.01.06

3.01.06.03 **count by threes forward and backward within the hundreds**

STRATEGY 1: Prepare and display a large one hundred chart. Ask a student to come to the chalkboard. Say, "Begin at zero and draw a circle around every third number." Repeat this procedure with other students until the chart is completed. Ask the students to begin at zero, name each circled number on the hundreds chart, and record these numbers in their notebooks beneath the title, Counting Forward by Threes.

e.g.,

⓪	1	2	③	4	5	⑥	7	8	⑨
10	11	⑫	13	14	⑮	16	17	⑱	19
20	㉑	22	23	㉔	25	26	㉗	28	29

Say, "How have we been counting?" (We have been counting forward by threes.) Demonstrate the effect of adding multiples of one hundred to the chart.

e.g.,

(300)	301	302	(303)	304	305	(306)	307	...
310	311	(312)	313	314	(315)	316	317	...
320	(321)	322	323	(324)	325	326	327	...

Ask the students to begin at 300 and name those numbers previously circled using the new multiples of one hundred. Count forward and backward. Ask the students to record these numbers in their notebooks as follows:

Counting Forward by Threes	Counting Backwards by Threes
300	312
303	309
306	306
.	.
.	.
.	.

3.01.06

3.01.06.04 **count by fours forward and backward within the hundreds**

STRATEGY 1: Place a sign for a different state in each corner of the classroom, e.g., NY, NJ, CT, PA. Prepare and distribute to each student a bus sign with a number and a state abbreviation written on it.

e.g.,

400 NY	404 NY	408 NY	412 NJ	416 NJ	420 NJ
424 CT	428 CT	432 CT	436 CT	440 CT	444 CT

Say, "Each corner of the classroom has a sign with the abbreviation of a state written on it." Ask the students to identify each abbreviation. Say, "Derek is a bus dispatcher who dispatches buses to different states. Pretend you are bus drivers. I will call the bus number and the state which matches the sign you are holding. You will go to the corner of the room which has a sign for your state. Stand in line in the same order in which you are called."

e.g.,

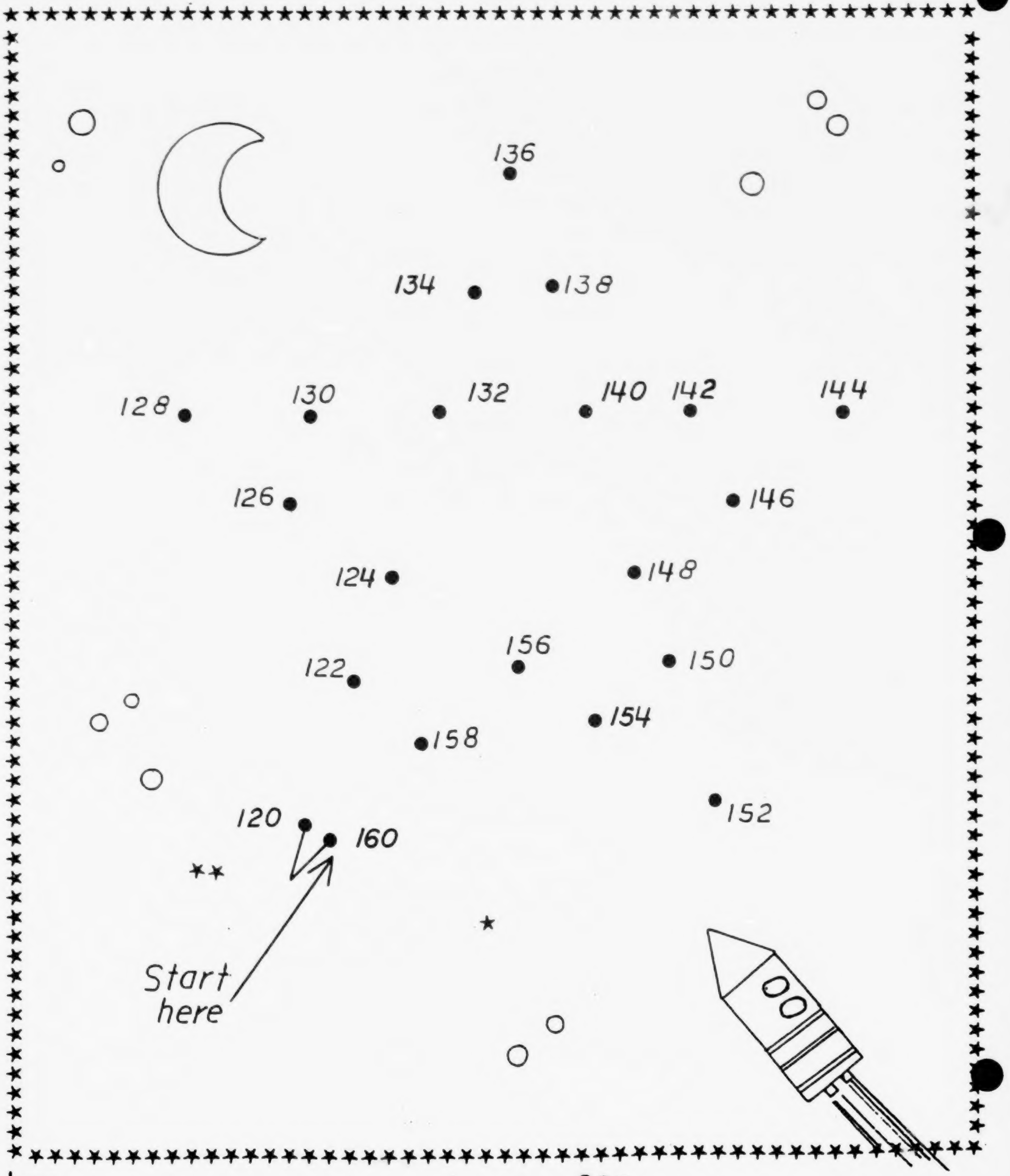
NY	400	404	408
NJ	412	416	420
CT	424	428	432
PA	436	440	444

Say, "Which buses go to New York?" (Buses 400, 404, and 408 go to NY) Ask the students who are holding the signs for buses going to New York to display their signs as the other students count forward by fours. Repeat this procedure with the other states. Say, "Which New York bus left the depot first? (Bus 400 left the depot first.) Did the numbers increase or decrease? (The numbers increased as each bus left the depot.) If they returned in decreasing order, which Connecticut bus returned first? (432 returned first.)... second? (428...) ...third? (424...) How are we counting? (We are counting by fours.) How many numbers do we skip each time we count?" (We skip three numbers.) Ask the students to count forward by fours beginning with 400 (500, 600 ...) as a student writes the numbers on the chalkboard and the other students copy them into their notebooks. **NOTE:** The strategies in this unit may be interchanged to teach counting by twos, threes, fours and fives.

P.O. 3.01.06.01

NAME: ______________________ CLASS: ________ DATE: ________

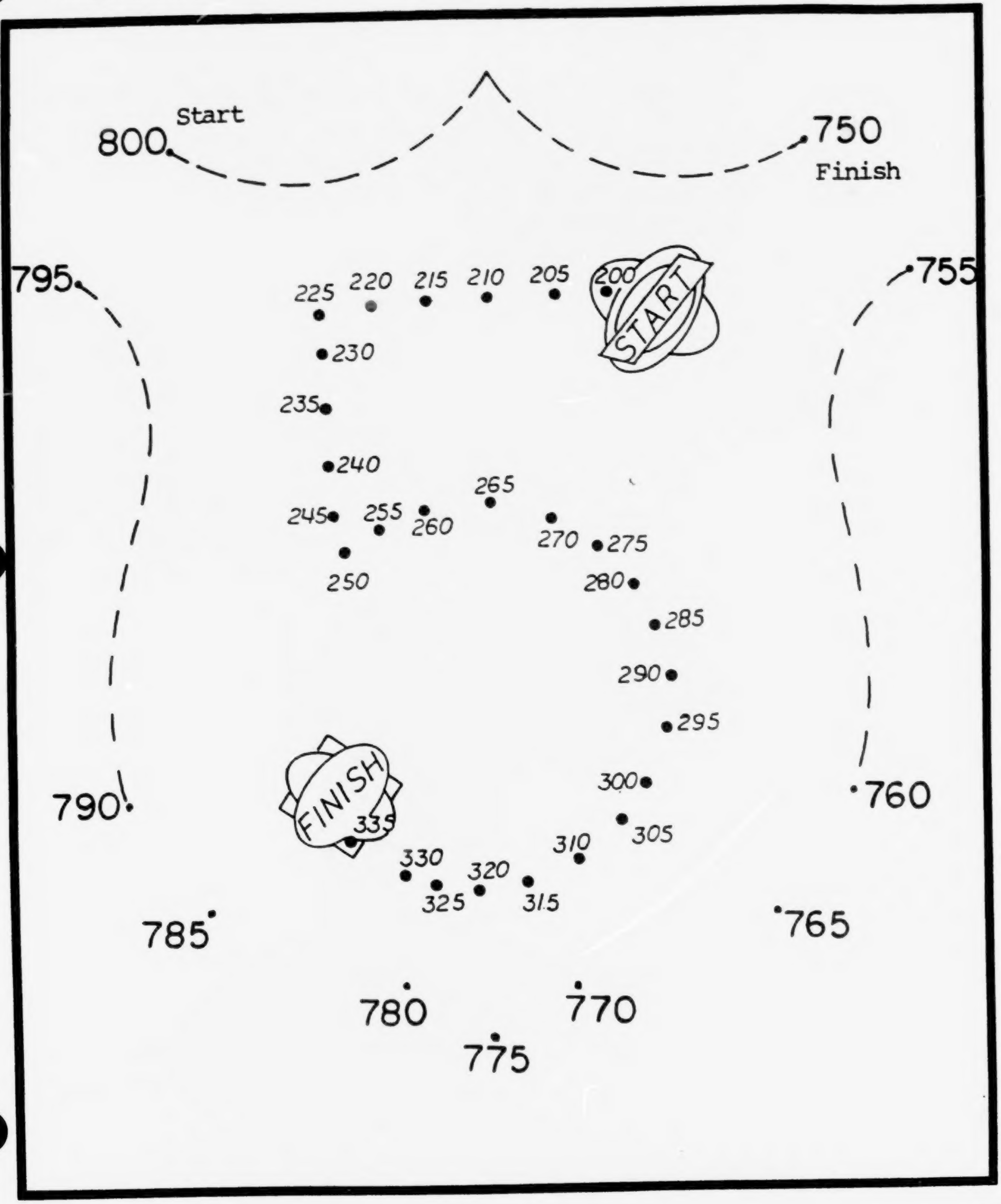
Connect the dots, counting backward by twos.
Check your work, counting forward by twos.


136
134
138
128
130
132
140
142
144
126
146
124
148
122
156
150
154
158
152
120
160
Start here

P.O. 3.01.06.02

NAME: ______________________ CLASS: ________ DATE: ________

Count forward by fives to connect the dots inside the badge.
Count backward by fives to connect the dots on the edge of the badge.

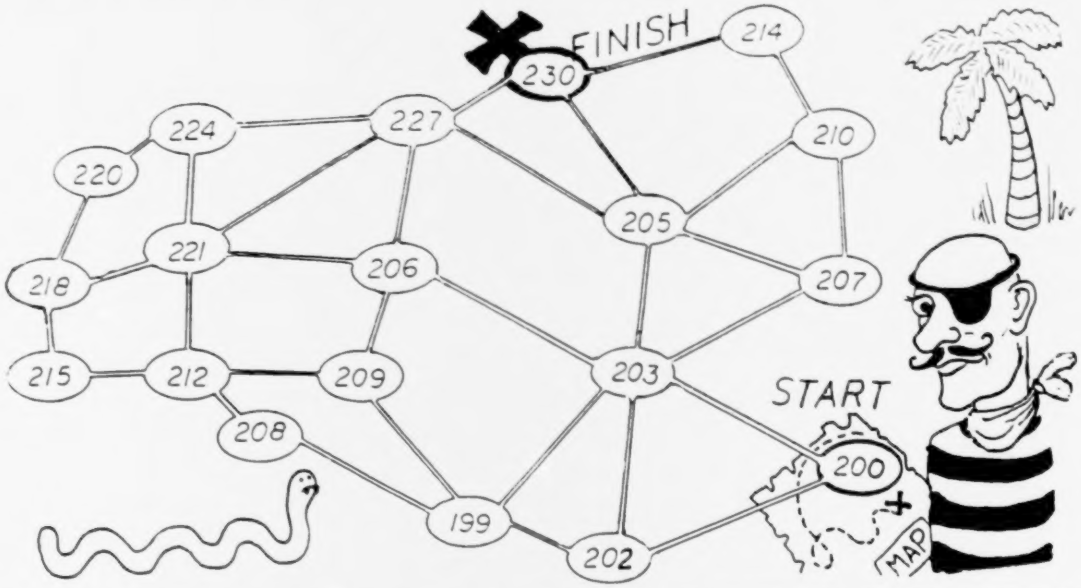

800 Start
750 Finish
795
755
790
760
785
765
780
770
775
START
200
205
210
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290
295
300
305
310
315
320
325
330
335
FINISH

P.O. 3.01.06.03

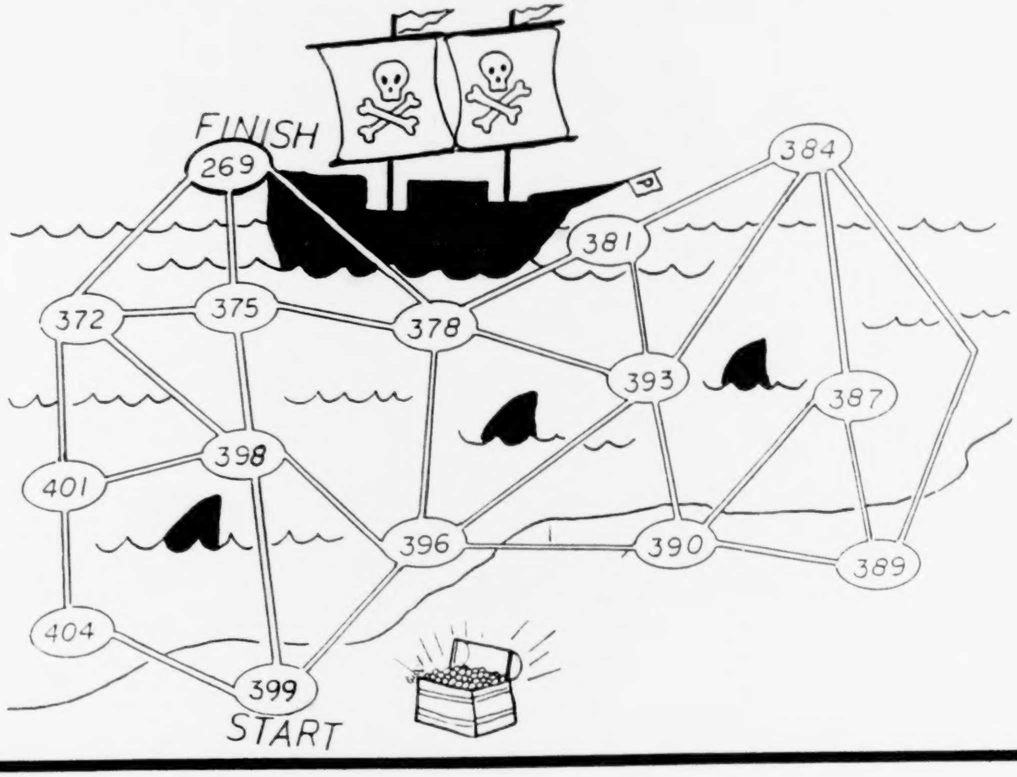
NAME: ____________________ CLASS: ________ DATE: ________

Follow the directions below.

Help the pirate find the treasure by counting forward by threes. Begin at 200.


FINISH
230
214
224
227
210
220
205
221
206
207
218
215
212
209
203
START
208
200
199
202
MAP

Help him carry the treasure to his ship by counting backward by threes. Begin at 399.


FINISH
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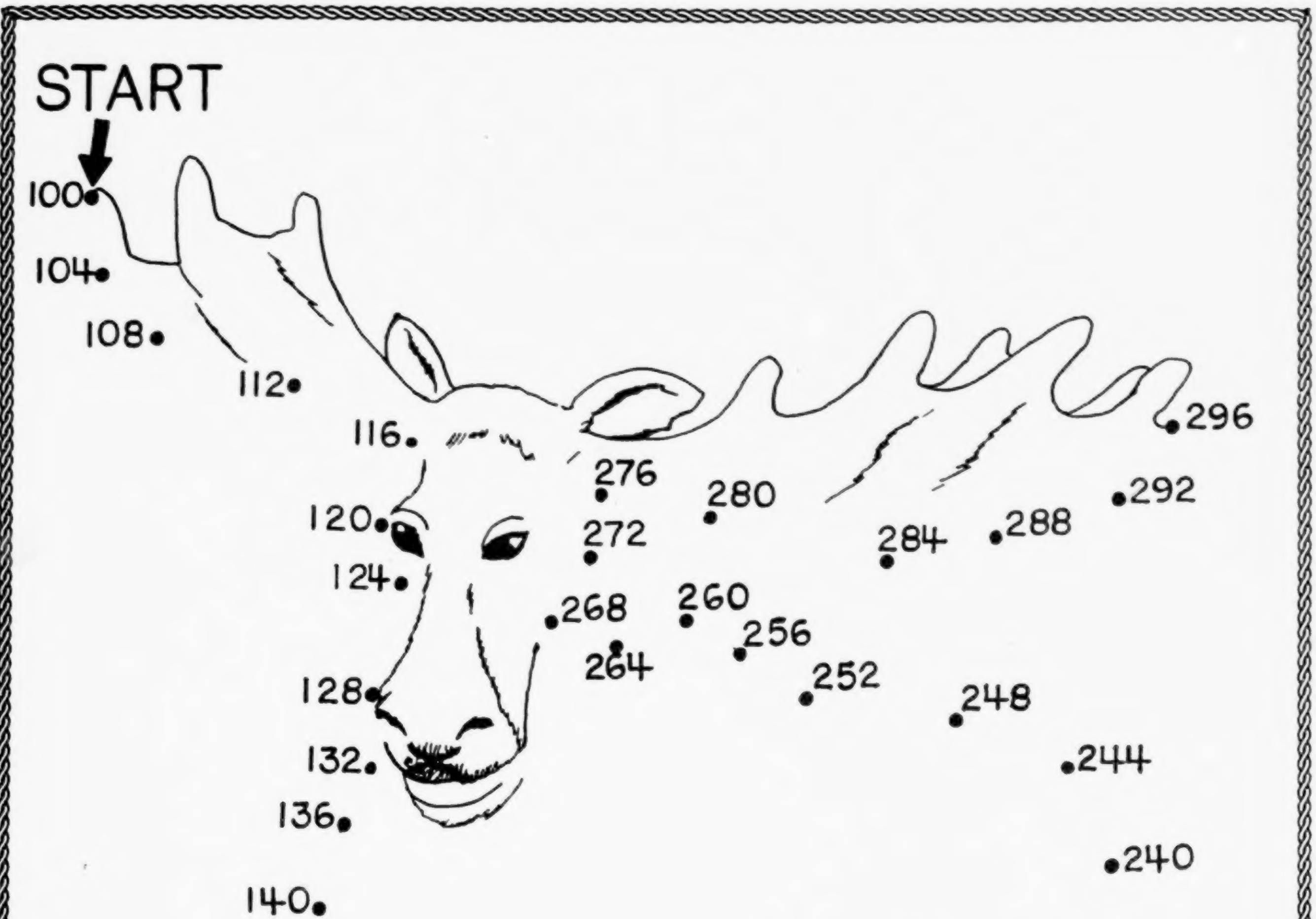
389
404
399
START

P.O. 3.01.06.04

NAME: ______________________ CLASS: ________ DATE: ________

Connect the dots, counting forward by fours.
Check your work, counting backward by fours.


START
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Unit 26

3.04.03 MULTIPLICATION OF TWOS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.04.03.01A multiply two (2) by the numbers one (1) through nine (9) using vertical and horizontal formats;

e.g.,

$$\begin{array}{r} 2 \\ \times\ 1 \\ \hline 2 \end{array} \qquad \begin{array}{r} 2 \\ \times\ 2 \\ \hline 4 \end{array} \qquad \begin{array}{r} 2 \\ \times\ 3 \\ \hline 6 \end{array}$$

1 x 2 = 2
2 x 2 = 4
3 x 2 = 6

*3.04.03.02A apply the commutative property of multiplication to the two times table;

e.g.,

2 x 6 = 12
6 x 2 = 12
2 x 6 = 6 x 2

3.04.03.03A solve word problems related to skills learned in this module.

e.g.,

If 2 boys each buy 6 apples, how many apples will they buy altogether?

VOCABULARY

TERMS	**SYMBOLS**
vertical	x
horizontal	
commutative	
factor	
product	

GETTING STARTED 1:

Place 20 straws (sticks, beans, cubes) in a paper bag. Say, "Let's find out how many straws are in this bag." Distribute the straws, two at a time, to the students. Ask the students to count by twos as the straws are distributed, e.g., 2,4,6... Ask a student to record the sequence of numbers on the chalkboard as the students are counting. When all the straws have been distributed, and the pattern has been completed, ask a student to repeat the pattern aloud, e.g., 2,4,6...20.

Say, "How did we count?" (We have counted by twos from two through twenty.) When we count by twos, we skip every other number, beginning with number one."

GETTING STARTED 2:

Teach the students the game, Buzz. Say, "The first student says 'one'. The next student would say the number 'two' but in the game, Buzz, each time a multiple of two should be said 'Buzz' is said instead. Therefore, the second student says 'Buzz' instead of 'two.' The third student says 'three.' The fourth student says 'Buzz' and so on. When a student forgets to say 'Buzz' for a multiple of two, he/she is out. In this game, all even numbers are replaced with the word, Buzz. We say only the odd numbers."

3.04.03

3.04.03.01 **multiply two (2) by the numbers one (1) through nine (9) using vertical and horizontal formats**

STRATEGY 1: Prepare and distribute 18 straws (sticks, beans, cubes) to each student or group of students. Say, "We have counted by two using straws (sticks, beans, cubes). Now use your straws to show one group of two. How many straws do you have in the group? (There are two straws in the group.) We can say that one group of two equals two." Write 1 x 2 = 2 on the chalkboard. Say, "This says, one times two equals two. What does the sign x tell us? (The x tells us to multiply.) This multiplication sentence says one group of two equals two or one times two equals two. It is written horizontally." Write $\begin{array}{r} 2 \\ \text{x}1 \\ \hline 2 \end{array}$ on the chalkboard. Say, "This is another way of writing one group of two equals two. It can be read as 2 taken 1 time."

Repeat this procedure through 9 groups of two. After each multiplication fact has been represented with the straws, ask various students to write the algorithms in vertical and horizontal formats on the chalkboard while the other students read the algorithms and copy them into their notebooks.

Summarize with the following questions:

- When we multiply by two, will the product be an even number or an odd number? (The product will be an even number.)
- Why do we multiply rather than add? (Multiplying is a fast way of adding many equal groups.)
- How can we write a multiplication algorithm? (A multiplication algorithm can be written in a horizontal or a vertical format.)

STRATEGY 2: Display 18 cubes and 9 boxes. Ask a student to place 2 cubes inside 1 box. Say, "What multiplication example describes one box with two cubes?" (One times two equals two.) On the chalkboard write the algorithm, 1 x 2 = 2, as the students write it in their notebooks. Say, "This algorithm is written horizontally. Is there another way to write this?" (One times two equals two can be written vertically.) Write the algorithm on the chalkboard, vertically.

e.g.,

$$1 \times 2 = 2 \qquad \begin{array}{r} 2 \\ \underline{\times 1} \\ 2 \end{array}$$

Repeat this procedure with 2 boxes and 4 straws through 9 boxes and 18 straws.

e.g.,

$$4 \times 2 = 8, \quad \begin{array}{r} 2 \\ \underline{\times 4} \\ 8 \end{array} \; \ldots \qquad 9 \times 2 = 18, \quad \begin{array}{r} 2 \\ \underline{\times 9} \\ 18 \end{array}$$

Say, "What does the first numeral mean in a horizontal algorithm for multiplication? (The first numeral tells the number of groups.) What does the second numeral mean? (The second numeral tells how many in each group.) What does the last numeral tell?" (The last numeral gives the total for all the groups.) In a vertical algorithm, what does the top numeral mean? (The top numeral tells how many in each group.) What does the middle numeral mean? (The middle numeral tells the number of groups.) What does the bottom numeral mean?" (The bottom numeral gives the total for all the groups.)

3.04.03.02 **apply the commutative property of multiplication to the two times table**

STRATEGY 1: Adapt Strategy 1 used in P.O. 3.04.01.03.

STRATEGY 2: Adapt Strategy 2 used in P.O. 3.04.01.03.

3.04.03

3.04.03.03 **solve word problems related to skills learned in this module**

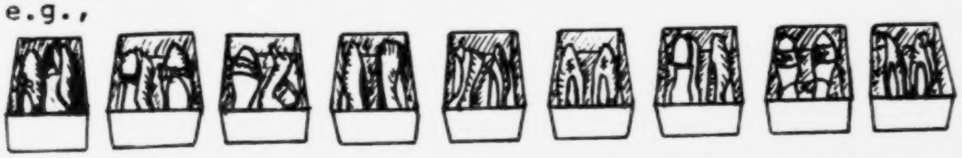
STRATEGY 1: Write a word problem on the chalkboard.

e.g.,

There are 9 shoe boxes on a shelf.
There are 2 shoes in each box.
How many shoes are there in all?

Say, "What are the key words?" Elicit from the students that the key phrase, in all, usually tells us to add. Say, "If we add nine plus two, will we know how many shoes there are in all?" (No, when a problem deals with two different items like pairs of shoes and boxes, we cannot add. We must count equal groups or multiply.) Ask a student to draw a diagram to represent the word problem.

e.g.,



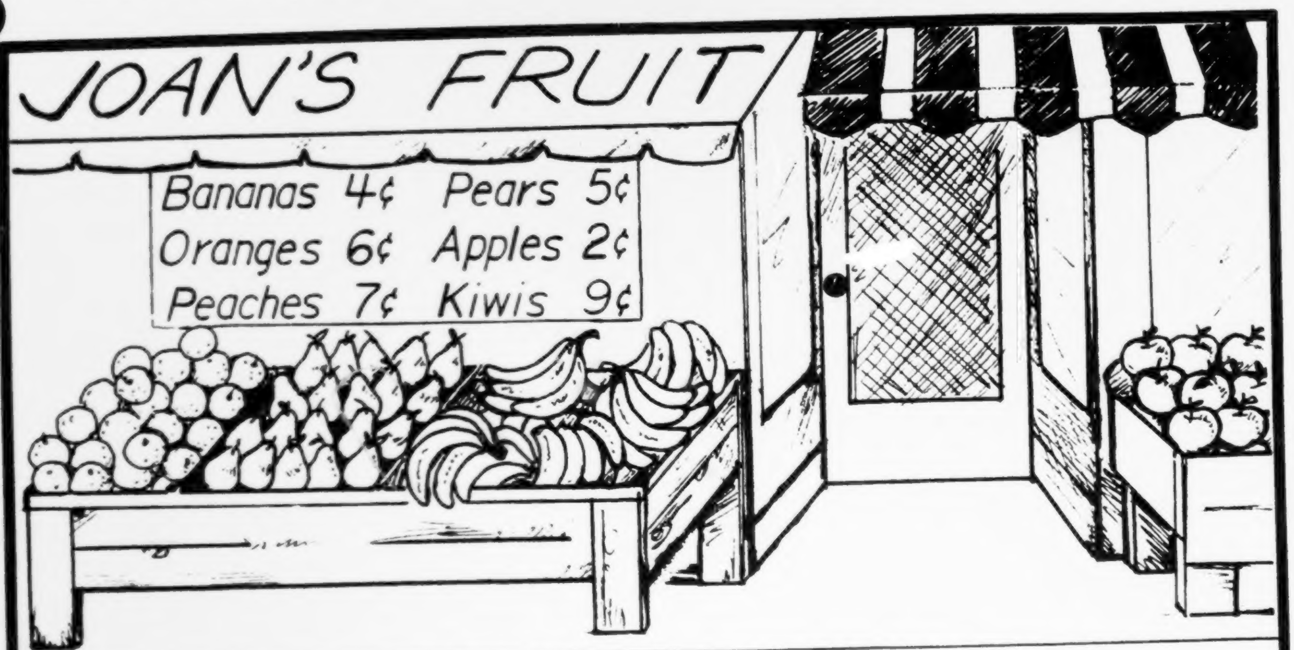
Ask another student to write and solve the algorithm for the problem at the chalkboard, e.g., 9 x 2 = 18 shoes. Say, "What does the numeral eighteen tell us?" (There are a total of eighteen shoes.) Repeat this procedure using other word problems which require knowledge of the two times table for a solution. Ask the students to write their answers to each problem in complete sentences.

NOTE: Some students may suggest creating a table or drawing a picture as alternative strategies. Accept all reasonable responses, but indicate that the algorithm is the most efficient.

P.O. 3.04.03.01-.03

NAME: ______________________ CLASS: ________ DATE: ________

Solve these problems by using the fruit store's price list.


JOAN'S FRUIT
Bananas 4¢
Pears 5¢
Oranges 6¢
Apples 2¢
Peaches 7¢
Kiwis 9¢

1. Rosa wants to buy 8 apples. How much will they cost?

2. Tamika will buy 2 pears. How much will they cost?

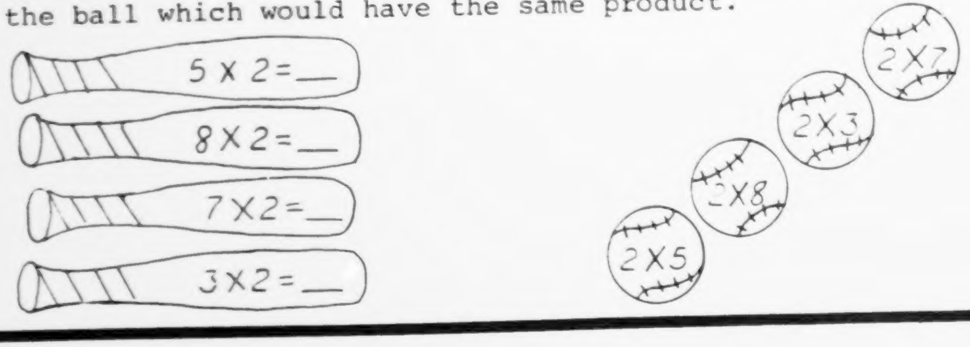
3. Two bananas cost 8¢. How much will 4 apples cost?

4. Pat will buy 2 kiwis. How much will he spend?

5. Paul bought 6 apples and 2 oranges. Paul paid_____.

ⓐ more for the oranges than for the apples.
ⓑ less for the oranges than for the apples.
ⓒ the same for the oranges and for the apples.
ⓓ more than 25¢ for the oranges and the apples.

Solve the number sentence in each bat. Draw a line from each bat to the ball which would have the same product.


5 X 2 = __
8 X 2 = __
7 X 2 = __
3 X 2 = __
2X7
2X3
2X8
2X5

SHARPENING YOUR SKILLS

Units 25, 26

Name: ____________ **Class:** ____________ **Date:** ____________

1. Count by twos. Which number is missing?

124 126 128 ☐ 132 134 136 138

ⓐ 129 ⓑ 130 ⓒ 131 ⓓ NG

2. Count backward by twos. Which number is missing?

254 252 ☐ 248 246 244 242 240

ⓔ 253 ⓕ 251 ⓖ 249 ⓗ NG

3. Count backward by fives. Which numbers are missing?

310, 305, _____, 295, 290, ______

4. When you count forward by threes which number comes after 603? ______

5. Count backward by threes. Which number is missing?

609 606 603 ☐

ⓐ 600 ⓑ 603 ⓒ 615 ⓓ 604

6. Count backward by fours. Which number comes next?

188, 184, 180, 176, ______

7. Which product makes both examples true?

$\begin{array}{r}2\\ \times 4\\ \hline\hline \boxed{}\end{array}$ $4 \times 2 = \boxed{}$

ⓐ 2 ⓑ 6 ⓒ 8 ⓓ NG

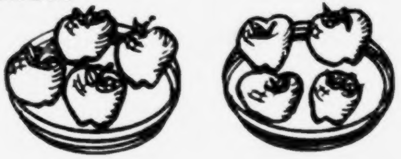
8. If $5 \times 2 = 10$, then $\boxed{} \times 5 = 10$

ⓔ 15 ⓕ 2 ⓖ 5 ⓗ 10

9. $6 \times 2 = 2 \times \boxed{}$

ⓐ 14 ⓑ 12 ⓒ 8 ⓓ 6

10. Which open number sentence shows how many apples Peter picked?



ⓔ $4 - 2 = \boxed{}$ ⓖ $8 - 2 = \boxed{}$

ⓕ $4 + 2 = \boxed{}$ ⓗ $2 \times 4 = \boxed{}$

3.04.04 MULTIPLICATION OF FIVES

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.04.04.01A multiply five (5) by the numbers one (1) through nine (9) using vertical and horizontal formats;

e.g.,

$$\begin{array}{r}5\\ \text{x}1\\ \hline 5\end{array}\qquad\begin{array}{r}5\\ \text{x}2\\ \hline 10\end{array}\qquad\begin{array}{r}5\\ \text{x}3\\ \hline 15\end{array}$$

1 x 5 = 5
2 x 5 = 10
3 x 5 = 15

*3.04.04.02A apply the commutative property of multiplication to the five times table;

e.g.,

5 x 6 = 30
6 x 5 = 30
5 x 6 = 6 x 5

3.04.04.03A solve word problems related to skills learned in this module.

e.g.,

If 6 students each receive 5 pencils, how many pencils are needed altogether?

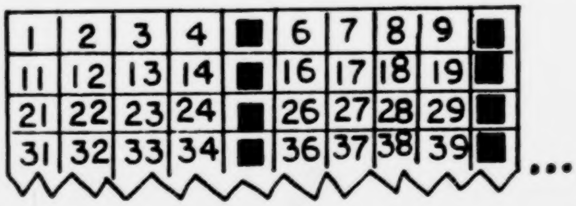
VOCABULARY

TERMS		SYMBOLS
multiplication	product	x
factor	commutative property	

GETTING STARTED 1:

Prepare and display a hundred chart. Place markers over the multiples of 5.

e.g.,



1	2	3	4	■	6	7	8	9	■
11	12	13	14	■	16	17	18	19	■
21	22	23	24	■	26	27	28	29	■
31	32	33	34	■	36	37	38	39	■

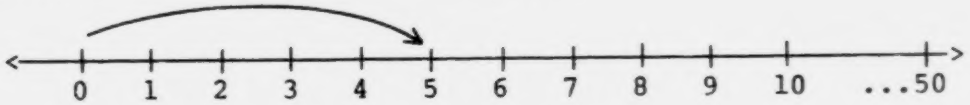
...

Ask the students to identify, in order, the numbers that are covered and to record them on the chalkboard. Say, "How have we counted? (We counted by fives.) When counting by fives what do you notice about the digit in the ones place in each number?" (When counting by fives, the digit in the ones place is either a zero or a five.)

GETTING STARTED 2:

Display a number line numbered 0 through 50. Prepare a large cutout of a rabbit or a frog. Say, "This frog's name is Cinco. Cinco means five in Spanish. Cinco can jump only 5 spaces at a time. If he starts at zero and takes one jump where will he land?" (He will land on 5.) Record the jumps on the chalkboard.

e.g.,



The Story of Cinco

1 jump -> 5

2 jumps -> 10

3 jumps -> 15

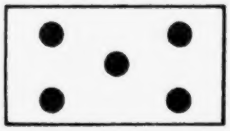
Say, "If Cinco starts at zero and jumps five spaces at a time, he can count by fives. Where will he be after 5 jumps? (He will be at 25.) How do you know without counting every number?" (We can count by fives.)

3.04.04

3.04.04.01 **multiply five (5) by the numbers one (1) through nine (9) using vertical and horizontal formats**

STRATEGY 1: Prepare several large index cards with 5 dots on each.

e.g.,



Say, "We have counted by fives using a hundreds chart and a number line. Today we will see how multiplication is a fast way of adding groups of fives. Display a large index card with 5 dots. How many groups of 5 do you see? (I see one group of five.) What number sentence tells us about 1 group of 5?" Elicit and record on the chalkboard, 1 x 5 = 5 and $\begin{array}{r} 5 \\ \times 1 \\ \hline 5 \end{array}$. Say, "How many dots are in one group of 5?" (There are 5 dots in 1 group of 5.) Repeat this procedure for 1 through 9 groups of 5, using both horizontal and vertical formats.

After all the facts are developed and recorded on the chalkboard, ask the students to read and record them in their notebooks.

e.g.,

1 x 5 = 5
2 x 5 = 10
.
.
.
9 x 5 = 45

$$\begin{array}{r} 5 \\ \times 1 \\ \hline 5 \end{array} \quad \begin{array}{r} 5 \\ \times 2 \\ \hline 10 \end{array} \quad \cdots \quad \begin{array}{r} 5 \\ \times 9 \\ \hline 45 \end{array}$$

STRATEGY 2: Prepare and distribute to each student or group of students, beans, pegboards, colored cubes, or bottle

STRATEGY 2:
cont'd

caps. Say, "When Chico jumped on the number line how many spaces did he jump at one time? (He jumped 5 spaces at a time.) When Cinco started at zero and jumped 5 spaces at a time he was counting by fives. Today we will see how multiplication is a fast way of counting and adding groups of five." Draw an array on the chalkboard.

e.g.,

●●●●●
●●●●●

Say, "How many rows are there? (There are 2 rows.) How many columns are there? (There are 5 columns.) What addition number sentence represents this picture? (5 + 5 = 10 is represented by this picture.) What multiplication number sentence is represented by this picture?" (This picture is represented by the number sentence, 2 x 5 = 10.) Repeat this procedure using different arrays.

e.g.,

●●●●●
●●●●●
●●●●●

3 x 5 = 15

●●●●●
●●●●●
●●●●●
●●●●●
●●●●●

5 x 5 = 25

Say, "Now let's use our beans (cubes, pegboards, or bottlecaps) to represent 3 groups of 5. Place 3 rows and 5 columns of beans on your desks. How many rows of beans are there? (There are 3 rows of beans.) How many columns of beans are there? (There are 5 columns of beans.) What multiplication number sentence represents 3 rows and 5 columns of beans?" Elicit 3 x 5 = and record it on the chalkboard.

Repeat this procedure using other numbers until all the facts for five are developed using both horizontal and vertical formats.

STRATEGY 2: cont'd Say, "How can we count groups of 5 in a fast way? (We can multiply by 5.) When we placed the rows and columns of beans on our desks we saw how the number of rows (1, 2, 3...9) changed while the number of columns (5) always remained the same."

3.04.04.02 **apply the commutative property of multiplication to the 5 times table**

STRATEGY 1: Adapt Strategy 1 used in P.O. 3.04.01.03.

STRATEGY 2: Adapt Strategy 2 used in P.O. 3.04.01.03.

3.04.04.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare 50 chips and display the following problem on the chalkboard:

> Veronica's class is having a party. Veronica will give 5 cookies to each child. There are 6 children seated at table 1. How many cookies will the children at table 1 need?

Say, "We will pretend these chips are cookies. How many children are at table 1? (There are 6 children at table 1.) Who will give them cookies? (Veronica will give them cookies.) How many cookies will each child get?" (Each child will get 5 cookies.) Ask "Veronica" to give 5 chips to each of the 6 students. Say, "How many cookies did Veronica give out? (Veronica gave out 30 cookies.) How can we represent this story problem with a number sentence?" Elicit the possible number sentences. Ask a student to record them on the chalkboard.

e.g.,

$5 + 5 + 5 + 5 + 5 + 5 = 30$, $6 \times 5 = 30$, $\begin{array}{r}5\\ \times 6\\ \hline 30\end{array}$

STRATEGY 1: cont'd

Say, "How did we find out that table 1 needed 30 cookies? (We multiplied six times five.) Why did we do that rather than add? (We multiplied six times five because it was faster than counting all of the cookies in groups of five.) Could we have solved it another way?" Accept any reasonable response, e.g., We could have made an array. We could have drawn a picture.

Repeat this procedure with other word problems using the 5 times table.

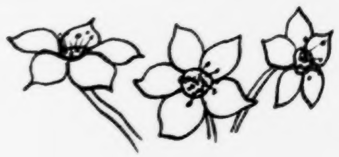
STRATEGY 2:

Say, "There are many ways to solve a problem. One way is to draw a picture about the problem." Prepare and display the following word problem:

There are 3 flowers in my vase.
Each flower has 5 petals.
How many petals are there in all?

Say, "Who can draw my three flowers? How many petals will you draw on each flower?" (There will be 5 petals on each flower.) After a student has drawn the flowers, say, "How many petals are there in all?" (There are 15 petals in all.) Ask another student to write the number sentence that solves the problem next to the illustration.

e.g.,



$3 \times 5 = 15$ petals

or

$\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$ petals

or

$5 + 5 + 5 = 15$ petals

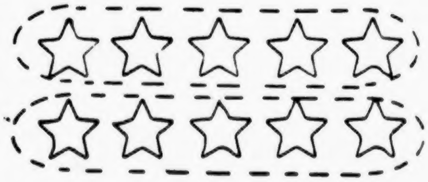
Say, "How did we find out the number of petals in all? (We multiplied three times five.) Why did we multiply?" (We multiplied because it was faster than adding when all the groups have the same amount.)

Repeat this procedure using illustrations that will be easy for the students to draw, e.g., balloons, apples.

P.O. 3.04.04.01 & .03

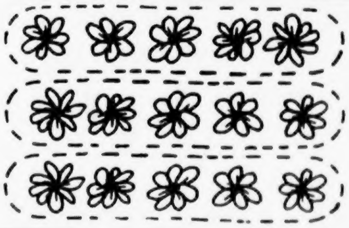
NAME: ____________________ CLASS: __________ DATE: ________

Write the multiplication facts in both vertical and horizontal formats.



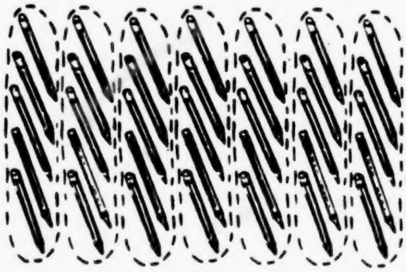
5
× 2
10

2 × 5 = 10



☐
× ☐
☐

☐ × ☐ = ☐



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× ☐
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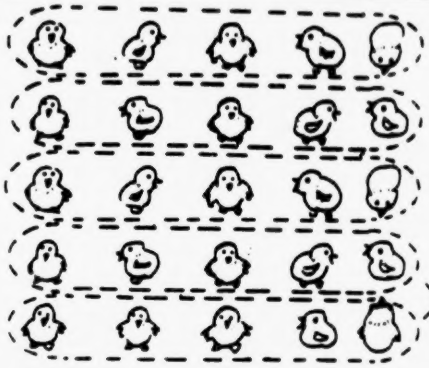
☐ × ☐ = ☐



☐
× ☐
☐

☐ × ☐ = ☐

Solve each word problem. Label your answers.

	Work Space
1. There are 5 rows of seats in the classroom. Nine students are seated in each row. How many students are there in all?	5 x 9 = 45
2. There are 5 boats at the dock. Four people are on each boat. How many people are there in all?	
3. There are 6 tables in the restaurant. Five people are at each table. How many people are there in all?	

CHALLENGE!

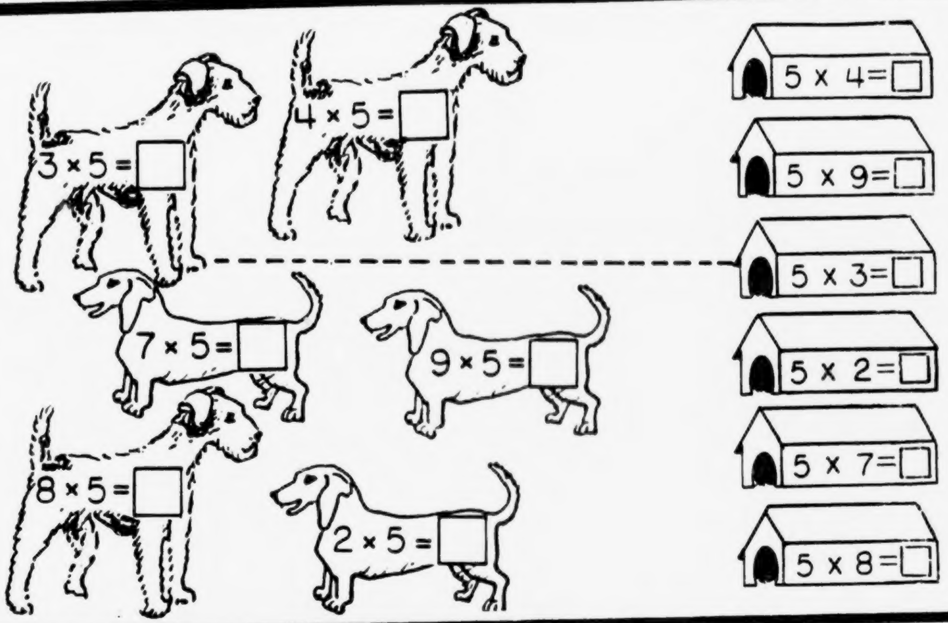
5 people are in each of 5 sailboats.
5 people are in each of 5 motorboats.
How many people are in all the boats?

There are ________ people in all the boats.

P.O. 3.04.04.02 & .04

NAME: ____________________ CLASS: ________ DATE: ________

Solve each number sentence. Draw a line from the dogs to the dog houses to show that multiplication is commutative.



Solve each word problem. Label your answer.

	Work Space
1. There are 6 tables with 5 children at each table. How many children are there in all? There are ________ children in all.	6 x 5 = 30
2. There are 5 tables with 6 children at each table. How many children are there in all? There are ________ children in all.	
3. There are 4 trees with 5 apples on each tree. How many apples are there in all? There are ________ apples in all.	
4. There are 5 trees with 4 apples on each tree. How many apples are there in all? There are ________ apples in all.	

Do you remember?

What number makes every subtraction example true? _____

$$\begin{array}{r} 455 \\ -216 \\ \hline 2\square 9 \end{array} \qquad \begin{array}{r} 892 \\ -544 \\ \hline \square 48 \end{array} \qquad \begin{array}{r} 791 \\ -46\square \\ \hline \square 28 \end{array} \qquad \begin{array}{r} 54\square \\ -207 \\ \hline \square\square 6 \end{array}$$

Unit 28

3.05.02 DIVISION OF WHOLE NUMBERS FOR TWOS THROUGH 18, FOR FIVES THROUGH 45

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.05.02.01A divide by two for dividends through 18 without a remainder;
e.g.,

		check
$18 \div 2 = 9$;	$\begin{array}{r} 9 \\ 2\overline{)18} \end{array}$;	$2 \times 9 = 18$

3.05.02.02A divide by five for dividends through 45 without a remainder;
e.g.,

		check
$45 \div 5 = 9$;	$\begin{array}{r} 9 \\ 5\overline{)45} \end{array}$;	$5 \times 9 = 45$

*3.05.02.03A recite the division facts for twos and fives;
e.g.,

	check
$2 \div 2 = 1$	$2 \times 1 = 2$
$4 \div 2 = 2$	$2 \times 2 = 4$
$18 \div 2 = 9$	$2 \times 9 = 18$
$5 \div 5 = 1$	$5 \times 1 = 5$
$10 \div 5 = 2$	$5 \times 2 = 10$
$45 \div 5 = 9$	$5 \times 9 = 45$

3.05.02.04A solve word problems related to skills learned in this module.
e.g.,

Thomas has 40 toy cars.
How many boxes does he need if he puts 5 toy cars in each box?

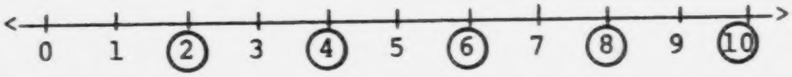
VOCABULARY

TERMS		SYMBOLS
divide	divisor	$\div$
dividend	quotient	$\overline{)\ }$

GETTING STARTED 1:

Display a number line. Ask a student to begin at zero and count by twos, circling each number as he/she counts.

e.g.,



Ask the students to recite the circled numbers. Repeat this procedure for counting by fives by displaying a number line numbered from 0 through 45.

GETTING STARTED 2:

Prepare and display 10 beads (bottle caps, discs, marbles). Ask five students to come to the front of the classroom. Say, "I have ten beads. I will share them equally among these five students. How can I do this?" (I can give each student one item at a time and continue until all the items are given out.) Demonstrate. Say, "How many beads does each student have? (Each student has 2 beads.) How can we write this as a number sentence?" Elicit and write on the chalkboard 10 ÷ 5 = $\square$.

Say "Is there another way to write this?" Elicit and write $\begin{array}{r}\square\\ 5\overline{)10}\end{array}$. Demonstrate how division can be shown as repeated subtraction.

e.g.,

$$\begin{array}{rl} 2 & \\ 5\overline{)10} & \\ -\underline{5} & 1 \text{ five} \\ 5 & \\ -\underline{5} & 1 \text{ five} \\ 0 & \end{array}$$

Repeat this procedure varying the number of items and students. Include division facts for 1 two through 5 twos and division facts for 1 five through 5 fives. Ask the students to identify the positions of the divisor, the dividend, and the quotient in both formats.

3.05.02

3.05.02.01 divide by two for dividends through 18 without a remainder

STRATEGY 1: Prepare and distribute to each student or group of students 18 buttons, (bottle caps, discs). Ask the students to count out six buttons and say, "How many groups of two buttons can you make? (I can make 3 groups of 2 buttons each.) Can you be sure there are 3 groups of 2?" (We can be sure by separating the buttons into groups of two.) Ask the students to separate the buttons into groups of 2. Say, "How many groups of 2 buttons did you make from the 6 buttons? (We made 3 groups of 2 buttons.) How can we write this in a division number sentence?" Ask 2 students to each write a division format on the chalkboard.

e.g.,

$6 \div 2 = 3 \qquad 2\overline{)6}^{\,3}$

Ask the students to read the number sentences and to identify the divisors, the dividends, and the quotients. Say, "Is there a way to check that $6 \div 2 = 3$?" (We can multiply the quotient times the divisor. If the product is the same as the dividend in the division example, we have probably divided correctly.)

e.g.,

check

$6 \div 2 = 3 \qquad 3 \times 2 = 6$

Repeat this procedure for division of twos for dividends through 18.

STRATEGY 2: Write the following word problem on the chalkboard:

> The bicycle shop is assembling
> bicycles. Each bicycle needs
> 2 wheels. If there are 8 wheels,
> how many bicycles will be assembled?

Say, "One way to solve this problem is to construct a table." Elicit the information to construct the following table:

wheels	bicycles
2	1
4	2
6	3
.	.
.	.
.	.
18	9

Say, "Do you see a pattern on this table? (Yes, as the number of bicycles increases by 1, the number of wheels increases by 2.) What is the solution to the word problem?" (4 bicycles will be assembled with 8 wheels.) Ask the students to explain how they used the table to solve the problem. Say, "Can we solve this problem with a number sentence? (Yes, 8 ÷ 2 = 4.) What clue in the problem indicates division?" (The word each is a clue for division.) Ask 2 students to each write a different division example representing this problem.

e.g.,

$$8 \div 2 = 4 \qquad 2\overline{)8}^{\,4}$$

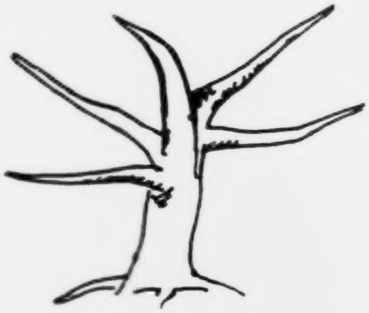
Repeat this procedure for division of twos through 18.

Note: See Strategy 1, P.O. 3.05.02.01 for the procedure for checking division.

3.05.02

3.05.02.02 **divide by five for dividends through 45 without a remainder**

STRATEGY 1: Draw a tree with 5 branches.
e.g.,



Collect 45 leaves, either real or paper. Place 20 leaves in a plastic bag. Say, "These leaves will be shared or divided equally among the five branches of the tree." Ask a student to do the actual sharing by separating the 20 leaves into 5 equal groups. Ask 2 students to record different number sentences on the chalkboard which reflect this experience.
e.g.,

$20 \div 5 = 4$ $\qquad$ $\begin{array}{r}4\\5\overline{)20}\end{array}$

Ask the students to read the number sentences and to identify the divisors, the dividends, and the quotients. Say, "How can we check these examples?" (We can multiply 4 times 5 or multiply 5 times 4. If the product is 20, the original dividend, we have divided correctly.) Ask a student to write the corresponding multiplication sentence on the chalkboard, next to the division number sentences.
e.g.

$20 \div 5 = 4$ $\qquad$ $\begin{array}{r}4\\5\overline{)20}\end{array}$ $\qquad$ $\begin{array}{c}\text{check}\\ \hline 5 \times 4 = 20\end{array}$

Repeat this procedure for division by 5 for dividends through 45.

STRATEGY 2: Prepare and distribute 45 counters to each group of students. Say, "Thirty astrochildren are traveling in 5 spaceships to the planet Astroland. There are an equal number of passengers in each spaceship. How many passengers are in each spaceship? What do we want to find out in this problem? (We want to find out the number of astrochildren there are in each spaceship.) What information are we given? (We know that there are 30 astrochildren and 5 spaceships.) How will we determine the number of passengers there are in each spaceship? (We can divide 30 into groups of 5.) How can we use our counters?" (If each counter represents 1 astro-child, we can count out 30 and divide them equally among the 5 spaceships.) Demonstrate by drawing 6 groups of 5 at the chalkboard, while the students use their counters to show 6 groups of 5. Say, "How many astrochildren are in each spaceship?" (If there are 30 astrochildren and 5 spaceships, then there are 6 astrochildren in each spaceship.) Ask a student to write a number sentence that represents the problem on the chalkboard, e.g., 30 ÷ 5 = 6. Ask the students to read the number sentence and to identify the divisor, the dividend and the quotient. Say, "Is there another way of writing the problem as a division sentence?" Ask a student to demonstrate another algorithm on the chalkboard.

e.g.,

$$5\overline{)30}^{\;6}$$

Ask a student to check the division sentences.

e.g.,

check

6 x 5 = 30 or 5 x 6 = 30

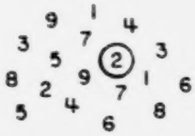
Repeat this procedure through 45 astrochildren traveling in 5 spaceships.

3.05.02

3.05.02.03 **recite the division facts for twos and fives**

STRATEGY 1: Prepare and display a set of flash cards with the division facts for twos through 18 and for fives through 45. Write each of the numbers 1 through 9 twice on various parts of the chalkboard.

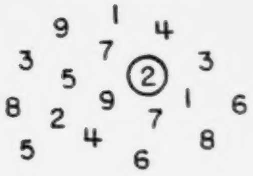
e.g.,



Say, "Today we will play Guess My Quotient. Each of these flash cards has a division fact written on it, but the quotient is missing, e.g., $4 \div 2 = \square$. You will select a card, read the fact, and circle the correct answer from among the numbers written on the chalkboard. You will then recite and write the complete division fact on the chalkboard."

e.g.,

Select a Quotient



Division Number Sentences

$4 \div 2 = 2$

Continue the game until all the flash cards have been used, all the numbers have been circled, all the division facts have been written on the chalkboard, and all the number facts have been recited.

3.05.02.04 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard:

STRATEGY 1:
cont'd

35 people will enter a rowing contest, beginning at Battery Park in Manhattan and ending at the Statue of Liberty on Liberty Island. There will be an equal number of rowers in each of 5 boats. How many rowers will be in each boat?

Say, "What information are we given? (There are 35 rowers, 5 boats, and an equal number of rowers in each boat.) What are we asked to find out? (We are asked to find the number of rowers in each boat.) How can we use the 35 discs to help us find the answer?" (We can make 5 equal rows of discs and then count the number of discs in each row.) Ask a student to arrange the discs in 5 equal rows. Elicit that there are 7 rowers in each boat. Say, "What operation can we use to find the answer? (We can divide.) Why?" (There are 35 rowers who must be divided among 5 boats. Ask 3 students to write and read division number sentences that represent the word problem.

e.g.,

$$35 \div 5 = 7 \qquad \begin{array}{r} 7 \\ 5\overline{)35} \end{array}$$

Ask the students to record the information on a chart.

e.g.,

Given Information	Asked To find	Number Sentence and Answer	Check
There are 35 people. There are 5 boats with an equal number of people in each boat.	How many people in each boat?	35 ÷ 5 = 7 7 people are in each boat.	5 x 7 = 35

Repeat this procedure to solve other word problems.

STRATEGY 2: Prepare and distribute to each student a crayon and colored construction paper. Write several division number sentences on the chalkboard, varying the division format.

e.g.,

$$18 \div 2 = 9 \qquad \begin{array}{r} 6 \\ 5\overline{)30} \end{array}$$

Say, "Select a division number sentence. On a piece of paper write a word problem to illustrate this number sentence. When you are pleased with the word problem write it in large letters on the construction paper. Write the matching number sentence on the reverse side."

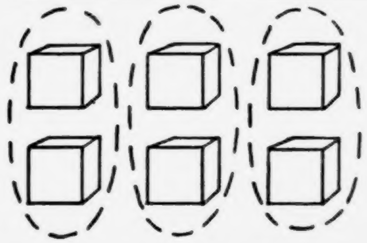
When the students have completed the task, ask them to exchange their story problems and to determine the number sentence which represents the problem. The students should state and write the information which was given, the information they are being asked to find, and the answer to the problem.

P.O. 3.05.02.01 & .04

NAME: ______________________ CLASS: ________ DATE: ________

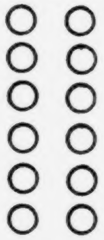
Follow the directions below.

Draw a ring around groups of 2. Complete each division example.



There are 6 blocks.
How many groups of 2?

$6 \div 2 =$ ☐



There are 12 circles.
How many groups of 2?

$\begin{array}{r} \square \\ 2\overline{)12} \end{array}$

Complete each division example.

$4 \div 2 =$ ☐ $\qquad \begin{array}{r} \square \\ 2\overline{)6} \end{array} \qquad 16 \div 2 =$ ☐

$8 \div 2 =$ ☐ $\qquad \begin{array}{r} \square \\ 2\overline{)10} \end{array} \qquad 10 \div 2 =$ ☐

$12 \div 2 =$ ☐ $\qquad \begin{array}{r} \square \\ 2\overline{)2} \end{array} \qquad 18 \div 2 =$ ☐

Write a number sentence to solve each problem.
Circle the key words.

A florist has 18 roses. She places 2 in each vase. How many vases did she use?

Two boys will share 14 marbles.
How many marbles will each boy have?

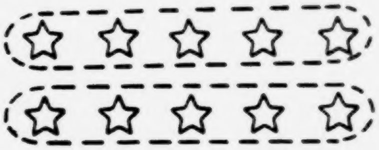
P.O. 3.05.02.02 & .04

NAME:____________________ **CLASS:**________ **DATE:**________

Follow the directions below.

Circle groups of 5. Complete each division example.

10 stars

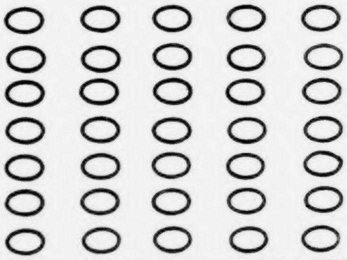


How many groups of 5? ☐

$10 \div 5 = \boxed{}$

$\begin{array}{r}\boxed{}\\5\overline{)10}\end{array}$

35 ovals

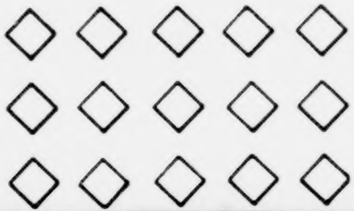


How many groups of 5? ☐

$35 \div 5 = \boxed{}$

$\begin{array}{r}\boxed{}\\5\overline{)35}\end{array}$

15 diamonds



How many groups of 5? ☐

$15 \div 5 = \boxed{}$

$\begin{array}{r}\boxed{}\\5\overline{)15}\end{array}$

Write a number sentence to solve each problem.
Circle the key words.

Mrs. Rivera's 5 children shared 30 balloons equally. How many balloons did each of her children get?

45 birds were placed in 5 cages. How many birds were in each cage if each cage held an equal number of birds?

Unit 29

3.09.01 POINTS AND LINES

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*3.09.01.01A recognize and name a point;

e.g.,

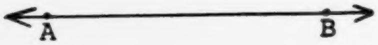
A point is a location which can be represented by a dot.

This is point A.

3.09.01.02A identify and name a line;

e.g.,

A line is a path of points which continues in two directions.

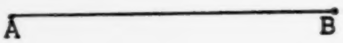


This is line AB. ($\overleftrightarrow{AB}$)

3.09.01.03A identify and name a line segment;

e.g.,

A line segment is a path of points between two end points.

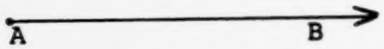


This is line segment AB. ($\overline{AB}$)

3.09.01.04A identify and name a ray.

e.g.,

A ray is a path of points which continues in one direction and has one end point.



This is ray AB. ($\overrightarrow{AB}$)

3.09.01

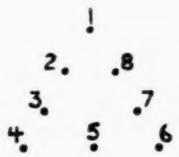
VOCABULARY

TERMS	SYMBOLS
line	⟷
point	•A
line segment	A•——•B
ray	A•——→B

GETTING STARTED 1:

Draw a group of dots on the chalkboard. Number each dot drawn.

e.g.,

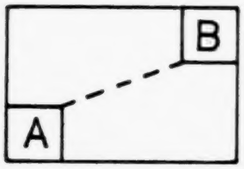


Say, "If we connect the dots we will make a figure." Ask a student to connect the dots beginning and ending with the dot labeled 1. Say, "What figure do you see? (I see a triangle.) What helped you to determine what the dots represent?" (The connecting lines helped us see the triangle.) Assist the students in observing that the straight lines drawn from point to point form a triangle. Repeat this procedure using other examples of dot representations.

GETTING STARTED 2:

Prepare two cards, each with a capital letter written on it. Place one card at the front door of the classroom. Place the other card, diagonally across the room.

e.g.,



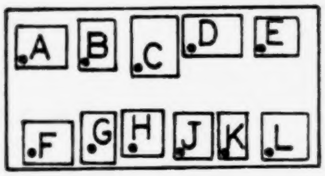
Ask several students to demonstrate the various paths one could take to get from Card A to Card B. Say, "Which path would be the shortest?" (The shortest path would be a straight line diagonally across the room.) Repeat this procedure by placing the cards in other parts of the classroom and asking the students to find the shortest path from A to B.

3.09.01

3.09.01.01 recognize and name a point

STRATEGY 1: Distribute a paper and a pencil to each student. Say, "Draw a diagram of the block on which you live. Represent each house or building with a dot and label each dot with a capital letter." Demonstrate.

e.g.,

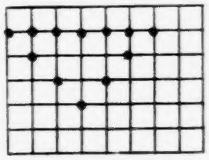


Say, "Each dot is called a point. A point names a location. Each house on your block is represented by a point." Write the description of a point on the chalkboard, e.g., A point is a location which can be represented by a dot. Say, "Why did we label each point?" (We labeled each point to identify it.)

Repeat this procedure using points to represent other locations on a map or picture, e.g., a classroom with desks, a lunchroom with tables, and a room with furniture.

STRATEGY 2: Prepare and distribute a sheet of graph paper to each student. On the chalkboard, display a sheet of 1-inch graph paper. Place dots at intersections of lines on the graph paper, which if connected, would form a triangle.

e.g.,



Say, "If we connect these dots, what figure will we see? (We will see a triangle.) Each dot is called a point and each point names a location." Ask the students to name each point with a capital letter. Say, "Each point now has a name, e.g., point A, point B, ... Why do we name each point?" (We name each point so we can locate it and describe it.)

STRATEGY 2: cont'd

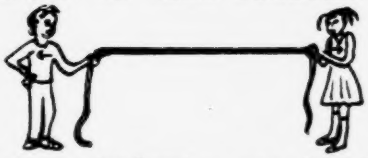
Repeat this procedure by asking the students to make other figures with representations of points on their graph paper. Ask the students to label each point with a capital letter.

3.09.01.02 **identify and name a line**

STRATEGY 1:

Prepare and display a long rope and two arrows made of cardboard. Ask two students to hold the rope, leaving about five feet between them, while the remaining rope hangs by each student's side. Tape or pin an arrow on each student.

e.g.,



Say, "These students are holding a rope which represents a line. The line does not end at the point where the students are holding it. The students are holding only a part of the line. The arrows indicate that the line continues in both directions."

Draw 4 dots on the chalkboard, e.g., ... Say, "A line is really a path of points which continues in two directions." Place dots between the dots already on the chalkboard, e.g., ... Say, "If we continue to place dots between the dots already on the chalkboard, we eventually draw a representation of a line." Ask several students to continue to place dots between dots until a solid line appears.

e.g.,

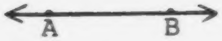
. . . . , ······· , ·············· , ---------- , ————

Draw the symbol for a line at the chalkboard, e.g., $\longleftrightarrow$. Say, "This is a symbol for a line. There are arrows on both ends of the symbol to indicate that a line goes on and on in two directions. We label the line with capital letters."

3.09.01

STRATEGY 1: cont'd

e.g.,



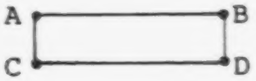
$\overleftrightarrow{AB}$

Write the description of a line on the chalkboard, e.g., A line is a path of points which extends endlessly in two directions. Ask different students to draw, label, and name lines on the chalkboard while the other students draw, label, and name lines in their notebooks.

3.09.01.03 **identify and name a segment**

STRATEGY 1: Prepare colored chalk. Draw a rectangle or a square on the chalkboard and label each endpoint.

e.g.,



Say, "What is the figure on the chalkboard? (This is a rectangle.) What can you tell us about this figure? (Accept all reasonable responses.) What are the names of the four points?" (The points are A, B, C, and D.) Outline side AB of the rectangle with colored chalk. Say, "The side which I have outlined is called a line segment. A line segment is different from a line. What is a line? (A line is a path of points which continues in two directions.) How does the symbol for a line indicate that it continues in two directions? (There are arrows at both ends.) Does line segment AB continue? (No, line segment AB does not continue.) Where does line segment AB begin? (Line segment AB begins at point A.) Where does line segment AB end?" (Line segment AB ends at point B.) On the chalkboard write $\overline{AB}$.Say, "This is the symbol for line segment AB. A line

STRATEGY 1: cont'd

segment is a part of a line and is represented by a line and two dots, e.g., $\overline{A \qquad B}$. The dots are endpoints which indicate where the line segment begins and ends. What other line segments are part of the rectangle?" (The other line segments which are part of the rectangle are $\overline{AC}$, $\overline{CD}$, and $\overline{BD}$.)

Repeat this procedure using other shapes. Ask the students to list all the line segments found on each shape.

STRATEGY 2:

Distribute a ruler to each student or group of students. Draw examples of line AB and segment AB on the chalkboard.

e.g.,

$$\overleftrightarrow{A \qquad\quad B} \qquad\qquad \overline{A \qquad\quad B}$$

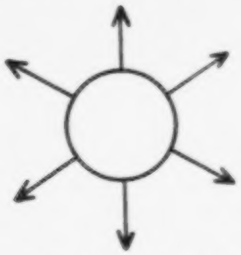
Say, "What is a a line? (A line is a path of points which continues in two directions.) Part of a line is a line segment. It is a path of points between two endpoints. A line segment does not go on and on. A line segment stops at its endpoints. Each endpoint is designated with a capital letter. The name of the line segment is the two capital letters. What is this line segment called?" (This line segment is called line segment AB.) Write the following definition of a line segment on the chalkboard: A line segment is a path of points between two endpoints. Ask the students to copy the definition into their notebooks. Say, "In your notebooks draw a line segment measuring two inches and name this line segment, CD." Ask a student to draw line segment CD on the chalkboard. Repeat this procedure by asking the students to draw and name other line segments. Say, "When writing the name of a line segment, a bar is placed over the letters which name the line segment." e.g., $\overline{F \quad G}$ means line segment $\overline{FG}$.

3.09.01

3.09.01.04 **identify and name a ray**

STRATEGY 1: Draw a diagram of the sun and its rays on the chalkboard. Be sure the end points touch the sun. Arrows should show the continuing rays.

e.g.,



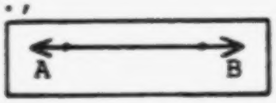
Say, "What is a line?" (A line is a path of points which continues in two directions.) Point to the rays of the sun. Say, "A ray is a path of points which continues in one direction."

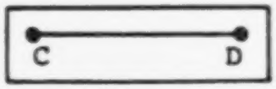
Write the definition for a ray on the chalkboard. Ask the students to copy the definition into their notebooks.

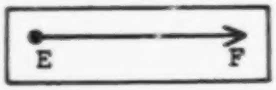
Write the symbol for ray AB under the definition, e.g., $\overrightarrow{AB}$. Say, "A ray is named with capital letters in a definite order. Be sure that you put the letters in the correct order. The symbol for ray AB shows that A is the endpoint and B indicates that it continues in one direction. Why is it important that you label a ray correctly?" (It is important to show which side has an endpoint and which side continues.)

STRATEGY 2: Prepare flashcards with lines, line segments and rays.

e.g.,





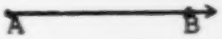


Write the definition of a ray on the chalkboard, e.g., A ray is a path of points which continues in

STRATEGY 2: cont'd

one direction. Draw a ray and the symbol for a ray under the definition.

e.g.,



$\overrightarrow{AB}$ means ray AB

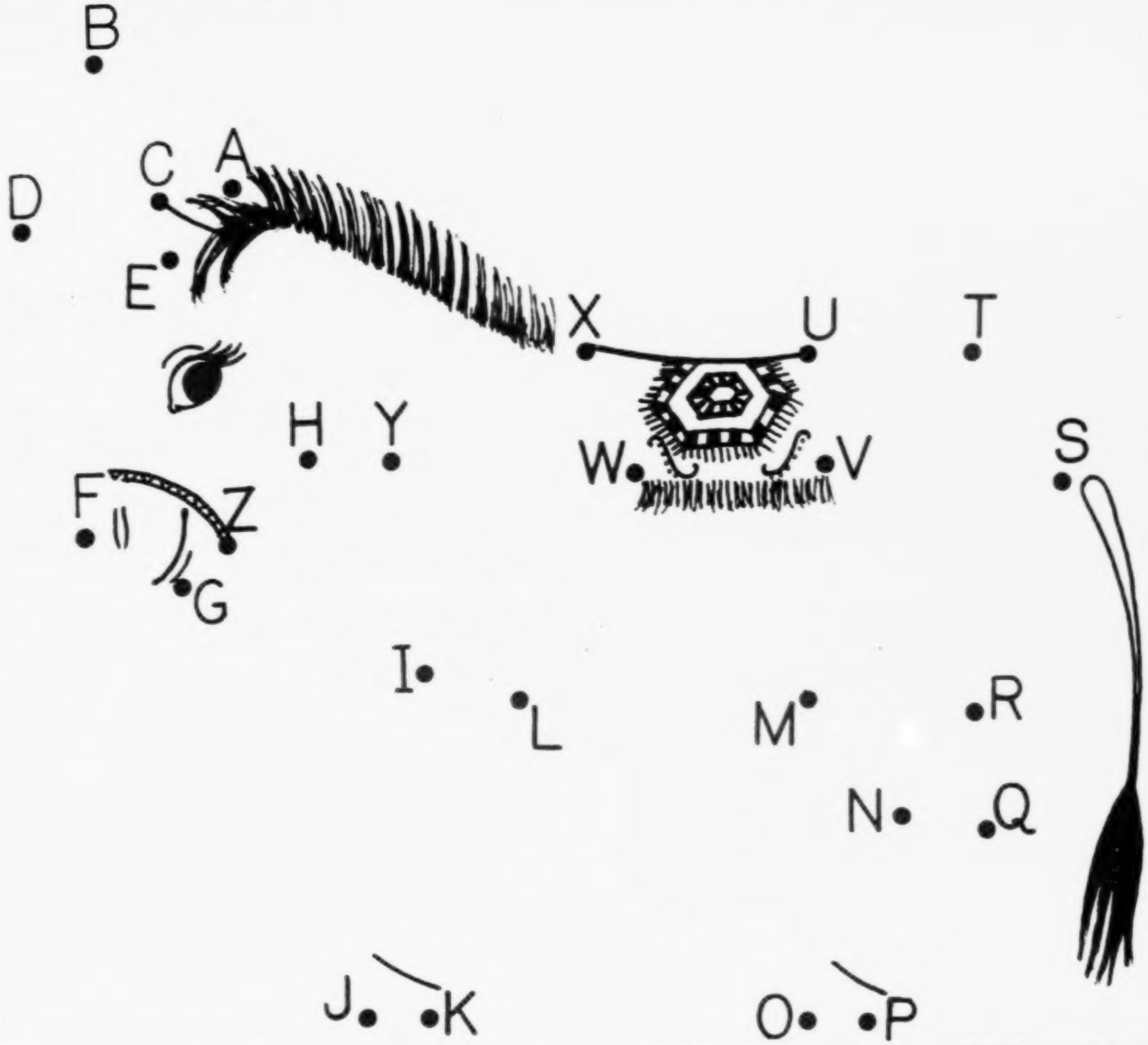
Say, "What is the difference between a ray and a line? (A line is a path of points which continues in two directions. A ray is a path of points which continues in one direction and has one endpoint.) What is the difference between a ray and a line segment?" (A line segment is a path of points which has 2 endpoints. It does not continue endlessly. A ray is a path of points which continues in one direction and has one endpoint.) Write the above definitions on the chalkboard. Ask the students to record them in their notebooks. Display the flashcards. Ask the students to identify each as either a ray, a line segment, or a line.

Continue this procedure until all the cards have been named.

P.O. 3.09.01.01

NAME: ______________________ CLASS: ________ DATE: ________

Each dot represents a point. Connect the dots in alphabetical order to complete the picture.


B
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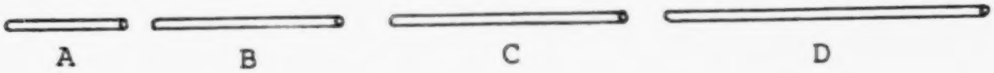
CHALLENGE! Look at these sticks.



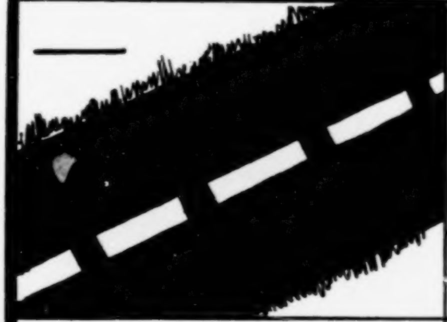
How many different triangles can you make using three sticks at a time?
Hint: Make a list.

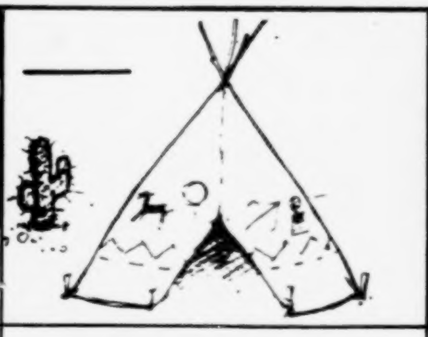
P.O. 3.09.01.02

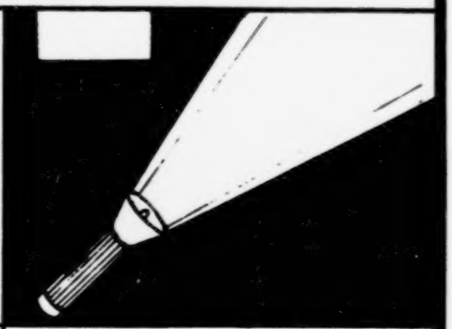
NAME:______________________________ CLASS:__________ DATE:________

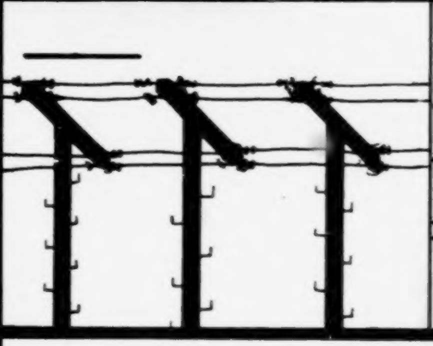
Follow the directions below.

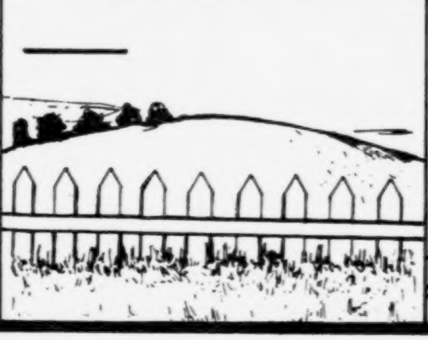
Place a check in each box with a picture suggesting lines.

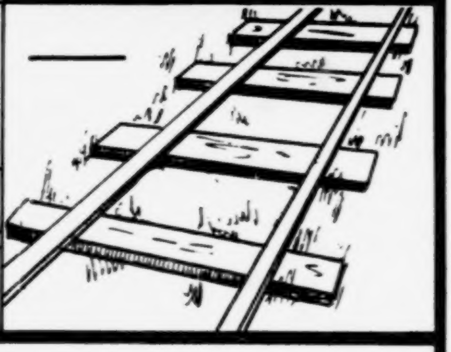












Draw a ring around the symbols which identify lines.

[✓ $\overleftrightarrow{AB}$] $\overrightarrow{CD}$ $\overline{EF}$ $\overleftarrow{GH}$ $\overleftrightarrow{IJ}$ $\overleftrightarrow{KL}$ $\overrightarrow{MN}$ $\overline{OP}$ $\overleftrightarrow{QR}$

Do you remember? Complete each pattern.

2 × 1 = 2, 2 × 2 = 4, __________, __________, 2 × 5 = 10

3 × 5 = 15, 3 × 4 = 12, __________, __________, 3 × 1 = 3

4 × 1 = 4, __________, __________, __________, 4 × 5 = 20

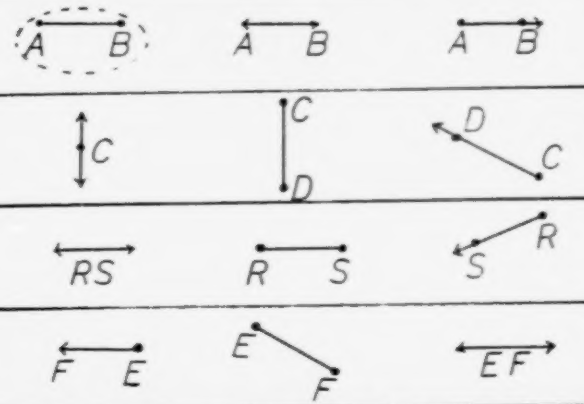
5 × 5 = 25, 5 × 4 = 20, __________, __________, __________

P.O. 3.09.01.03-.04

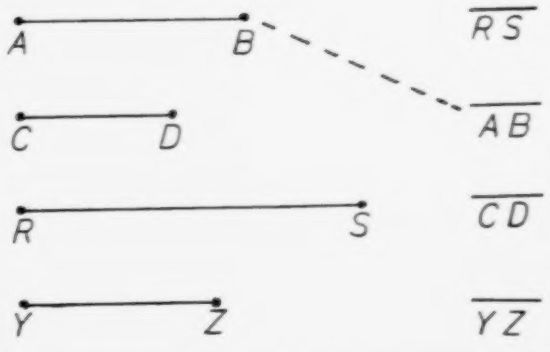
NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

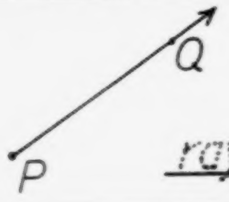
Circle the line segments.


A B
A B
A B
C
C D
D C
RS
R S
S R
F E
E F
EF

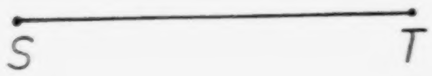
Match the line segments with their symbols.


A B
C D
R S
Y Z
$\overline{RS}$
$\overline{AB}$
$\overline{CD}$
$\overline{YZ}$

Identify and name each drawing. Circle the drawings of rays.



ray PQ or $\overrightarrow{PQ}$



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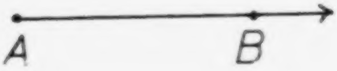

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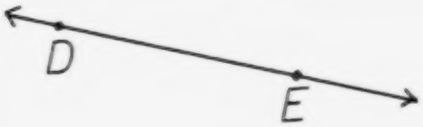

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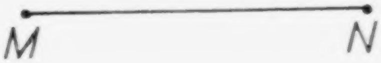

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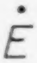


____

DO YOU REMEMBER?

The ice cream man sold 135 cones on Park Avenue. He sold 264 cones on Broadway. How many cones did he sell altogether?

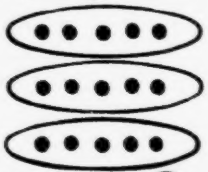
Popeye ate 110 cans of spinach last year. This year he ate 212 cans. How many more cans of spinach did he eat this year?

SHARPENING YOUR SKILLS

Units 27, 28, 29

Name: ____________________ **Class:** __________ **Date:** __________

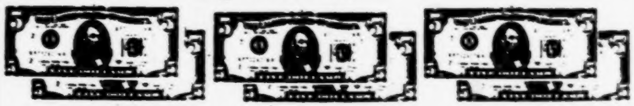
1. How many groups of five?



ⓐ 15 fives ⓒ 3 fives

ⓑ 5 fives ⓓ 1 five

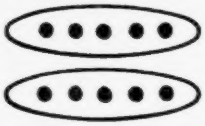
2. How many fives?



ⓔ 30 fives ⓖ 5 fives

ⓕ 6 fives ⓗ 1 five

3. Write a multiplication number sentence to describe this array.



____

4. What number makes both examples true? ________

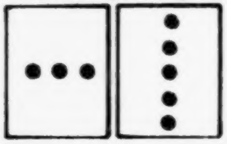
$6 \times 5 = \boxed{}$

$$\begin{array}{r} 5 \\ \underline{\times 6} \\ \boxed{} \end{array}$$

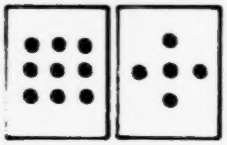
5. Which cards describe

$3 \times 5 = 5 \times 3$

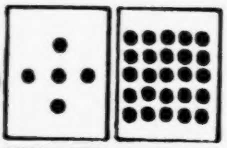
ⓐ



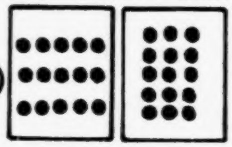
ⓑ



ⓒ



ⓓ



6. If $5 \times 8 = 40$

then $8 \times \boxed{} = 40$

$\boxed{}$ = ____

7. Each day Paula saves 5¢. How much money will she save at the end of a week?

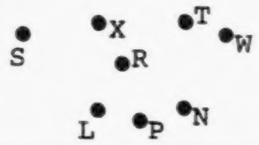
Paula will save __________.

8. Divide.

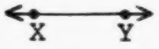
$$\begin{array}{r} \boxed{} \\ 2\overline{)14} \end{array} \qquad \begin{array}{r} \boxed{} \\ 5\overline{)30} \end{array}$$

$18 \div 2 = \boxed{}$ $40 \div 5 = \boxed{}$

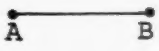
9. Connect four points to make a square.



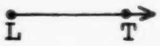
10. Circle the correct choice.



line, ray, line segment



line, ray, line segment



line, ray, line segment

3.10.05 WEIGHT IN METRIC UNITS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.10.05.01B identify equivalent metric units of weight;

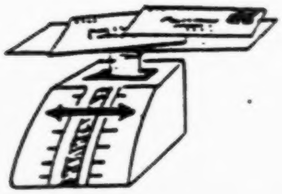
e.g.,

1 gram = 1000 milligrams

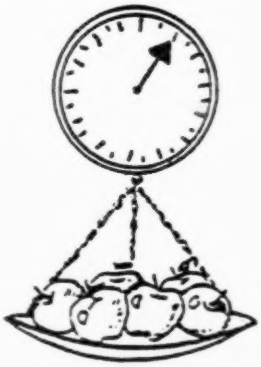
1 kilogram = 1000 grams

*3.10.05.02A read various types of scales using metric units.

e.g.,



9g



1kg

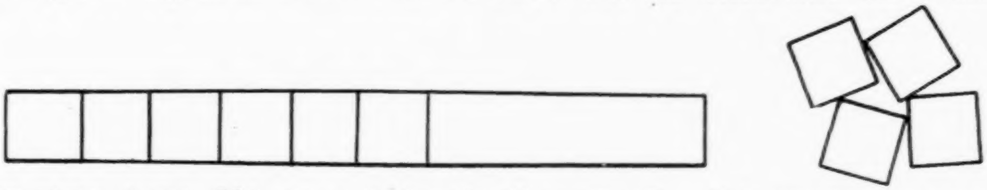
VOCABULARY

TERMS	SYMBOLS
gram	g
milligram	mg
kilogram	kg
balance scale	

GETTING STARTED 1:

Prepare and distribute squared material to each student or group of students. Say, "How many ones are in 1 ten? (There are 10 ones in 1 ten.) Use your squared material to show how 10 ones fit on 1 tens strip."

e.g.,



Say, "How many tens fit on a 1 hundred square? (10 tens fit on a 1 hundred square.) Show this with your squared material. How many hundreds equal one thousand?" (10 hundreds equal 1000.) Write these relationships on a chart on the chalkboard.

e.g.,

10 ones = 1 ten
10 tens = 1 hundred
10 hundreds = 1 thousand
100 ones = 1 hundred

GETTING STARTED 2:

Prepare gram and kilogram weights made of plastic or metal and several objects of different weights, e.g., a brick, a paper clip, a box of cereal, a coin. Ask the students to compare the weight of the objects with the metric weights by holding the metric weight in one hand and the object in the other hand. Say, "Which is heavier, the brick or 1 kilogram? Which is lighter, the box of cereal or 1 gram? Ask the students how they would verify their answers. Elicit that the students can check by weighing each item.

3.10.05

3.10.05.01 identify equivalent metric units of weight

STRATEGY 1: Prepare and display a balance scale or kilogram dial scale and gram and kilogram weights including several 50g, 100g, and 500g weights. Ask the students to look at and hold a gram weight and a kilogram weight and to estimate about how many grams are equal to a kilogram ... milligrams to a gram. Say, "How can we verify our estimates?" (We can verify our estimates by placing the kilogram (gram) on one side of the scale and placing enough grams (milligrams) on the other side of the scale to balance the scale.) On the chalkboard write 1 kilogram = ____ grams. Elicit that 1 kilogram = 1000 grams. Repeat this procedure of estimating and verifying using other metric relationships.

e.g.,

1000 g = 1 kg
500 g = $\frac{1}{2}$ kg
1000 mg = 1 gram
500 mg = $\frac{1}{2}$ gram
2000 g = 2 kg

STRATEGY 2: Prepare a balance scale, a set of weights, a package of low calorie sweetener, and an empty plastic liter bottle, as well as other objects which weigh 1 kilogram, 1 gram, 500 grams and 500 milligrams. Ask a student to estimate the weight of the sweetener and then to weigh it and record its weight on the chalkboard. Fill the liter bottle with water and ask a student to estimate its weight and then weigh it. Record the actual weight on the chalkboard. Say, "If the sweetener weighs one gram and the bottle of water weighs 1000 grams or one kilogram, how many packets of sweetener would we need to balance the container?"

STRATEGY 2: cont'd (We would need 1000 packets of sweetener to balance the container.) On the chalkboard write 1 kilogram = 1,000 grams. Repeat the estimating and the weighing to determine other metric equivalents.

3.10.05.02 **read various types of scales using metric units**

STRATEGY 1: Display different types of scales, such as a balance scale and a dial scale. Ask the students to estimate and weigh various classroom items, e.g., writing implements, books, manipulative materials. Before each item is weighed say, "Should we measure this item in milligrams, grams or kilograms? How much do you think it weighs?" Compare the estimates with the measured weights and summarize the results on a chart.

e.g.,

Object	**Estimated Weight**	**Measured Weight**
dictionary		
pen		
flower pot		

P.O. 3.10.05.01

NAME: ______________________ CLASS: ________ DATE: ________

Balance the scale by placing an equal amount of weight on each side. Draw a line to connect equal weights.

2000 g

1000 g

500 g

1000 mg

2000 mg

500 mg

$\frac{1}{2}$ g

$\frac{1}{2}$ kg

2 g

2 kg

1 kg

1 g

Do you remember?

There is a ☐ around one number in each number sentence. Select a word from the list which describes that number and write it on the line.

$14 - \boxed{5} = 9$ subtrahend

$\boxed{5} \times 3 = 15$ ____________

$8 - 3 = \boxed{5}$ ____________

$12 \div \boxed{2} = 6$ ____________

$\boxed{11} - 4 = 7$ ____________

$6 + 7 = \boxed{13}$ ____________

$20 \div 5 = \boxed{4}$ ____________

$\boxed{9} + 3 = 12$ ____________

WORD LIST

quotient
sum
product
minuend
subtrahend

factor
difference
divisor
addend
dividend

3.07.01 DECIMALS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.07.01.01B identify and read a decimal;

e.g.,

0.4

Say, "four tenths."

3.07.01.02B write tenths as decimals;

e.g.,

$\frac{3}{10} = 0.3$

3.07.01.03B count by tenths.

e.g.,

0.1, 0.2, 0.3, 0.4, 0.5, 0.6,
0.7, 0.8, 0.9, 1.0, 1 whole

VOCABULARY

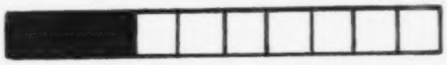
TERMS

whole number
decimal
tenths
decimal point

GETTING STARTED 1:

Prepare and display an oaktag strip divided into tenths. Say, "This is one whole. Into how many equal parts has this strip been divided? (This strip has been divided into ten equal parts.) What do we call each part of the whole? (Each part of the whole is called one tenth.) How many tenths do we need to make one whole?" (We need ten tenths to make one whole.) Shade in three of the parts.

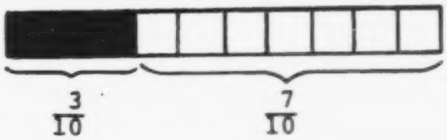
e.g.,



Say, "What part of the whole is shaded?" (Three tenths have been shaded.) Ask a student to write three tenths on the chalkboard, e.g., $\frac{3}{10}$. Say, "How does the shaded part, three tenths, compare to the whole? (It is less than the whole.) What part is not shaded?" (Seven tenths are not shaded.) Ask a student to write $\frac{7}{10}$ on the chalkboard.

Say, "Copy the strip, which has been divided into 10 parts, into your notebooks. Shade in 3 of the parts. Leave 7 parts unshaded. Label the shaded and the unshaded parts."

e.g.,



GETTING STARTED 2:

Write 973 on the chalkboard. Say, "In which place is the 9? (The 9 is in the hundreds place.) ... the 7? (... the tens place.) ... the 3?" (... the ones place.) Repeat this procedure with other 3-digit numbers.

GETTING STARTED 2: cont'd

Write 793 on the chalkboard. Reverse the procedure and ask the students to say the place value of each digit beginning at the ones place. Say, "How are these numbers the same? (They are both three digit numbers. They both have the numerals 3,7, and 9.) How are they different?" (They are different in value. 973 is greater than 793.)

3.07.01

3.07.01.01 identify and read a decimal

STRATEGY 1: Prepare and distribute a tens strip to each student. Display a tens strip and say, "This tens strip is equal to 1 whole. It has been divided into 10 equal parts. If we call the whole strip one, what can we call each part?" (Each part can be called one tenth.) On the chalkboard write $\frac{1}{10}$ and 0.1. Point to 0.1 and say, "Another way to write the fraction, one tenth is to write it as a decimal. Where have we seen a decimal point before? (A decimal point is used to separate the dollars from the cents when we write about money.) Just as the decimal point separates dollars from cents, it is also used to separate whole numbers from fractional parts.

The zero means there are no ones, or whole numbers. The number to the right of the decimal point represents tenths. We read this decimal as one tenth. It represents the same amount as the fraction, one tenth."

On the chalkboard write 0.2, 0.3 ... 0.9. Say, "If zero point one is read as one tenth, how will we read these numbers?" Ask the students to read the decimals written on the chalkboard and to write the words under each decimal number. Ask the students to write the equivalent fractions for each decimal number under the words.

e.g.,

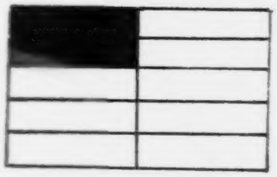
0.2
two tenths
$\frac{2}{10}$

Repeat this procedure using other examples.

STRATEGY 2: Prepare and distribute to each student a sheet of paper divided into ten equal parts. Ask each student to shade in a different number of parts of the whole paper and to identify it.

STRATEGY 2:
cont'd

e.g.,



= $\frac{2}{10}$

Write the decimal notations on the chalkboard.

e.g.,

0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9

Say, "This is another way to name tenths. We read these decimal numbers the same way we read the fractions for tenths; one tenth, two tenths ..." Ask the students to read the decimal numbers aloud. Ask each student to come to the chalkboard with his/her paper. Say, "Place your paper under the matching decimal notation. Why did you place your sheet under this decimal notation?" (I shaded two-tenths of the whole and that is the model for the decimal, two tenths.)

Ask a student to write the fractional notation two tenths below the decimal two tenths.

e.g.,

0.2	decimal
$\frac{2}{10}$	fraction

Continue this procedure through 0.9. Ask the students to copy this into their notebooks. Say, "We have used a decimal point when writing about dollars and cents. Why do we use the decimal point with money? (The decimal point separates the dollars from the cents.) The decimal points written on the chalkboard separate whole numbers from tenths. The place to the left of the decimal point represents ones. What happens to the place value of numbers as we go to the right? (They get smaller, e.g., 200, 20, 2, .2) The number to the right of the decimal point is smaller than one whole. It represents tenths."

STRATEGY 2: cont'd

On the chalkboard write 4, 0.2, 0.6, 19, 422, 0.5. Ask a student to circle only the decimal numbers and say them aloud. Repeat this procedure with other groups of numbers.

3.07.01.02 **write tenths as decimals**

STRATEGY 1:

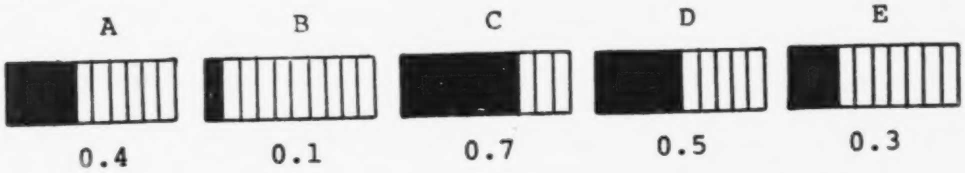
Distribute a tens strip to each student. Say, "How many equal parts are there on the strip?" (There are ten equal parts.) Ask the students to shade in some of the boxes. Say, "What part of the whole strip did you shade? (I shaded in seven boxes or seven tenths of the whole strip.) How can that be written?" (We can write that as the fraction, seven tenths, or we can write it as the decimal, seven tenths.) Ask a student to demonstrate on the chalkboard.

e.g.,

$\frac{7}{10}$ or .7

Display the students' models. Ask the students to read and write the decimal which corresponds with the parts of the tens strip that are shaded.

e.g.,

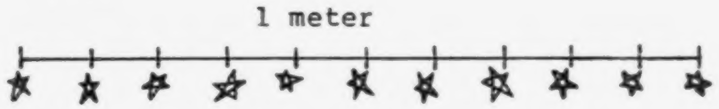


Ask various students to come to the chalkboard to write the decimal notation for each model as the other students do the same at their desks.

Say, "What is another way to identify each model?" (We could write the fraction for each.) Ask several students to write the fractions below each decimal on the chalkboard, e.g., $\frac{4}{10}$, $\frac{1}{10}$, $\frac{7}{10}$, $\frac{5}{10}$, $\frac{3}{10}$. Say, "How does the fraction notation compare with the decimal notation?" (The fraction and the decimal sound the same, represent the same amount, but they are written differently.)

STRATEGY 2: At the chalkboard draw a line one meter in length. Use stars to mark off points on the line which are one decimeter apart (10 centimeters).

e.g.,



Say, "This line is one meter in length. The stars on the line are 1 decimeter apart. How many decimeters are in a meter? (There are 10 decimeters in a meter.) The meter is divided into ten equal parts. You can show the length of an object using decimal notation." Draw a line above the meter to represent the length of an object which is exactly two decimeters long. Say, "This line is less than a meter in length. What fractional part of a meter describes the length of this line?" (It is two tenths of a meter long.) Ask a student to write two tenths of a meter in decimal form on the chalkboard. Repeat this procedure drawing other lines which measure tenths of a meter exactly. Ask the students to write the length of each line in decimal form on a chart in their notebooks.

e.g.,

Object	Length in Fractional Form	Length in Decimal Form	Length in Words
Line A	$\frac{2}{10}$ m	.2 m	two tenths of a meter
Line B	$\frac{1}{10}$ m	.1 m	one tenth of a meter
Line C	$\frac{4}{10}$ m	.4 m	four tenths of a meter

Ask the students to say each line and its length, e.g., "The line is two tenths of a meter long." Say, "How does the length of each line compare to a meter? (They are all less than a meter in length.) How does this decimal point help us record this?" (It shows that the amount is less than one whole.)

3.07.01

3.07.01.03 count by tenths

STRATEGY 1: Prepare lengths of adding machine tape less than one meter, marked off in decimeters on one side of the tape. Place the strips face down on a desk. Divide the students into two teams. Say, "Each of these strips are different in length but each is less than one meter in length. Each tenth of a meter is marked on the strip. A student from each team will guess the length of the strip by looking at the blank side and record his/her guess on the chart in decimal notation."

e.g.,

Team A	Guess	Actual Length
Roberto	0.3 m	

The strip will then be turned over and the students will count the marks aloud by tenths. The actual length will then be recorded on the chart.

e.g.,

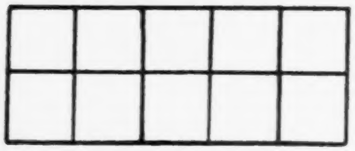
Team A	Guess	Real Length
Roberto	0.3 m	0.5 m

Repeat this procedure until all the strips have been used. The team with the greatest number of correct guesses wins the game.

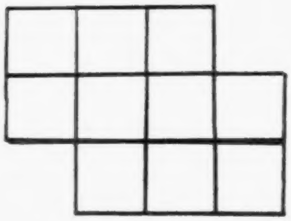
P.O. 3.07.01.01

NAME: ____________________ CLASS: ________ DATE: ________

Color the amount indicated below each picture.



0.2



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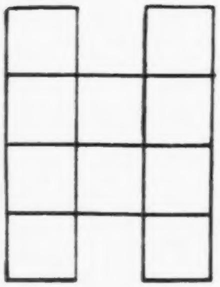

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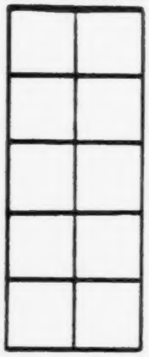

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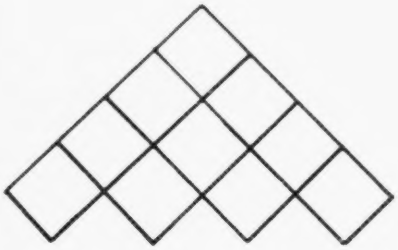
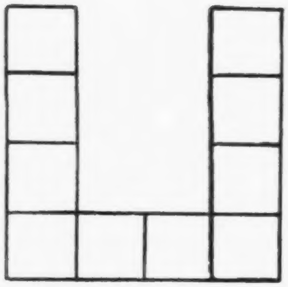


0.4



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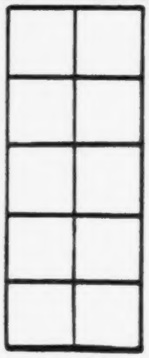

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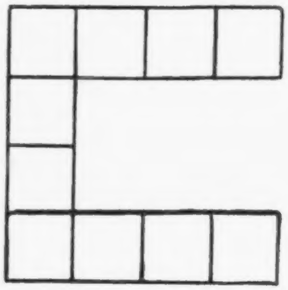
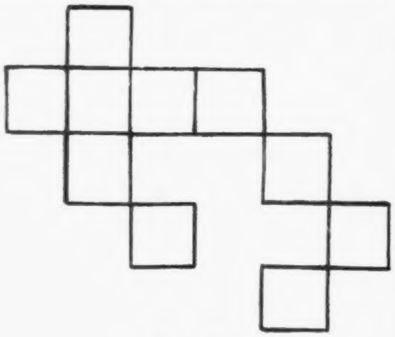


0.1



0.6

CHALLENGE!

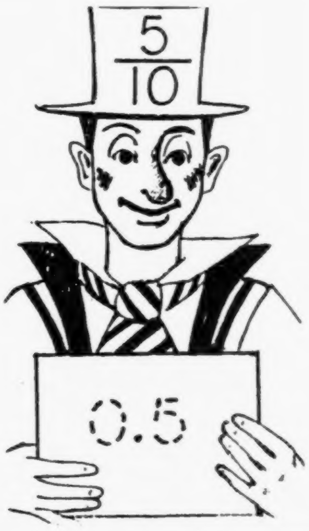
Draw a figure
which has 0.6
shaded.

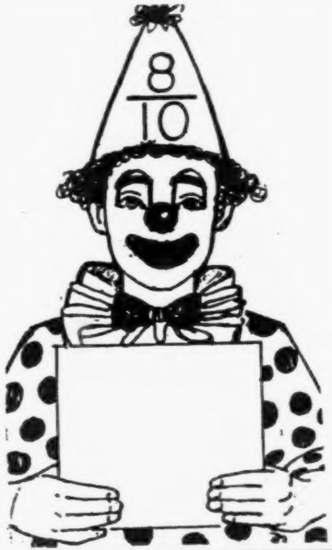
P.O. 3.07.01.02

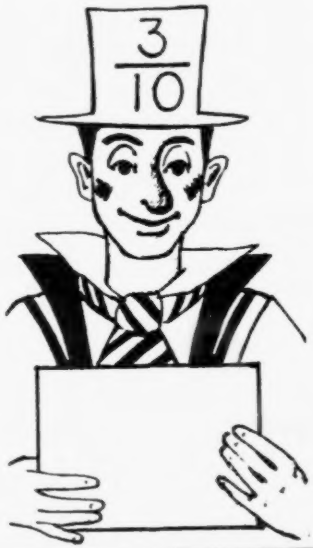
NAME: ______________________ CLASS: ________ DATE: ________

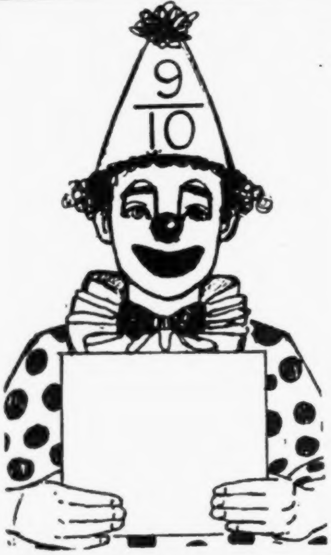
Follow the directions below.

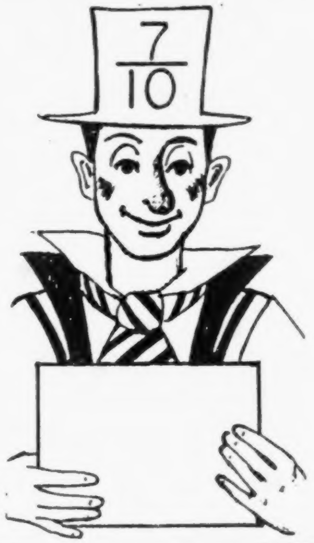
Write the fraction on each clown's hat as a decimal.

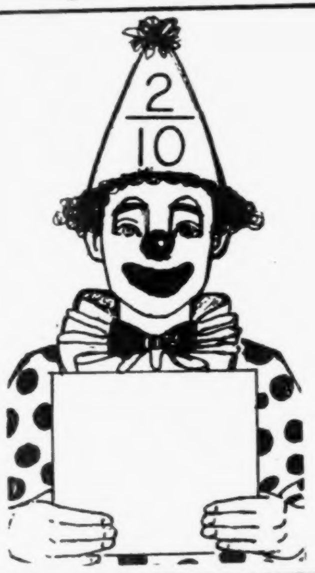












CHALLENGE!

Count by tenths. Cross out the numbers which do not belong.

0.1, 0.2, ~~.03~~, 0.3, 0.4, 5, 50, 0.5,

0.6, 70, 0.7, 0.8, 9, 0.9, 1 WHOLE

Unit 32

3.02.04 ADDITION OF 2- AND 3-DIGIT NUMBERS WITH ONE REGROUPING (EXCHANGE) TENS TO HUNDREDS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.02.04.01A add two 2-digit numbers with regrouping (exchange) tens to hundreds and check; e.g.,

$$\begin{array}{r} {}^{1}93 \\ +\ 35 \\ \hline 128 \end{array} \qquad 93 + 35 = 128 \qquad \begin{array}{r} \underline{\text{check}} \\ {}^{1}35 \\ +\ 93 \\ \hline 128 \end{array}$$

3.02.04.02A add two 3-digit numbers with regrouping (exchange) tens to hundreds and check; e.g,

$$\begin{array}{r} {}^{1} \\ 143 \\ +271 \\ \hline 414 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ {}^{1} \\ 271 \\ +143 \\ \hline 414 \end{array}$$

*3.02.04.03A solve word problems related to skills learned in this module. e.g.,

> Joey had 90 marbles. His brother gave him 87 more. How many marbles does he have now?

VOCABULARY

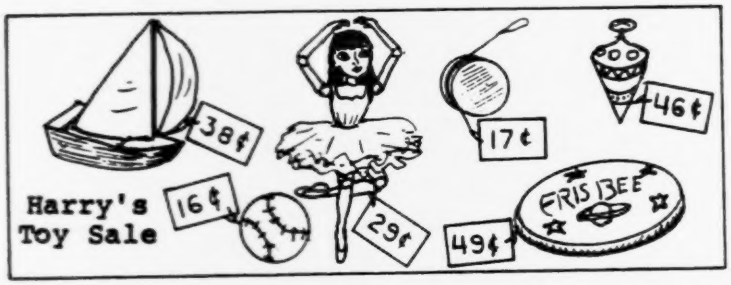
TERMS

exchange
regroup
vertical
horizontal

GETTING STARTED 1:

Prepare and display a chart with toys and price tags.

e.g.,



Say, "Today is Harry's special toy sale. All third graders can purchase these toys at a very low price. How much does each toy cost? (The boat costs 38¢, the top costs 46¢...) Each student may buy two items. After you choose the two items you want, how will you find the total cost?" (We will add the prices of the toys.) Ask several students to come to the chalkboard, write the cost of each item they purchased, and the total amount they spent.

e.g.,

29¢	cost of doll
+17¢	cost of yo-yo
46¢	total cost

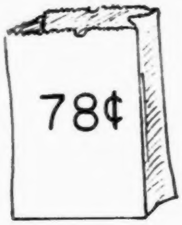
Review each example with the students. Say, "How can you check your work to be sure your answer is correct? (We can add the numbers again in reverse order.) How will the sums compare?" (If we added correctly the sums will be the same because addition is commutative. The order of the addends does not affect the sum.) Ask the students to check their work.

Repeat this procedure with the other students' choices.

GETTING STARTED 2:

Use the chart from Getting Started 1. Say, "When Ben arrived home after school, his toys were in a large bag with the total price of both toys on the outside of the bag."

e.g.,



Say, "His sister was eager to know which two toys he bought. Ben showed her the chart from Harry's Toy sale and said, 'You can keep both toys if you can tell me which two toys I bought.' Maria looked at the total amount shown on the bag and laughed because she knew which two toys were in the bag. How did Maria know which two toys were in the bag? (She knew he spent 78¢. She found the two toys which add up to 78¢.) How do you think she did that? (She chose 2 toys and added the costs. She added the digits in the ones place to see if the sum was 8.) Which two toys do you think she chose? (She chose the doll and the frisbee.) What is the sum of the ones?" (The sum of the ones is 18. We place the 8 in the ones column and we place the 1, which is 1 ten, at the top of the tens column and then add.)

Ask a student to write an addition example on the chalkboard for this story, label it, solve it, and check it.

Repeat this procedure with other amounts.

NOTE: There are other approaches to this problem, e.g., guess and check, estimation, and rounding.

3.02.04

3.02.04.01 **add two 2-digit numbers with regrouping (exchange) tens to hundreds and check**

STRATEGY 1: Prepare and distribute squared material (hundreds, tens and ones) to each student or group of students. Say, "Louis has 91 baseball cards. His sister has 43 baseball cards. How many baseball cards do they have altogether? What do we want to find out in this problem? (We want to know how many baseball cards they have altogether.) What information will help us solve the problem?" (We know the number of cards each one has.) Ask a student to come to the chalkboard and write an example to represent the problem.

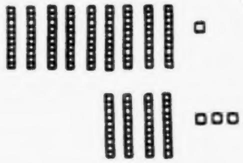
e.g.,

$$\begin{array}{rl} 91 & \text{number of cards Louis has} \\ \underline{+43} & \text{number of cards Maria has} \end{array}$$

Say, "We will use our squared material to help us solve the problem. How do we use squared material to represent 91 and 43?" (We represent 91 with 9 tens and 1 one. We represent 43 with 4 tens and 3 ones.)

e.g.,

$$\begin{array}{r} 91 \\ \underline{+43} \end{array}$$



Say, "Let's count your ones. How many ones are there in all?" (There are four ones in all.) Ask a student to add the ones in the example on the chalkboard.

e.g.,

$$\begin{array}{rl} 91 & \text{number of cards Louis has} \\ \underline{+43} & \text{number of cards Maria has} \\ 4 & \end{array}$$

Say, "Count your tens. How many tens are there? (There are thirteen tens.) Look at the example. How much is 9 tens plus 4 tens? (9 tens plus 4 tens equals 13 tens.) Why can't we write thirteen in the tens place? (Each place can have only one digit.)

STRATEGY 1: cont'd

Say, "When the sum of two or more numbers is greater than nine, we must rename the sum. How can we rename 13 tens?" (We can exchange 10 tens for 1 hundred.) Demonstrate the exchange of 10 tens for 1 hundred as the students do the same at their desks. Say, "How many tens do we have now? (We now have 3 tens.) How many hundreds do we have?" (We have 1 hundred.) Just as we regrouped our squared material, we can also show the regrouping in the example. After regrouping, how many tens did we have?" (We had 3 tens.) Write a 3 in the tens column in the sum. Say, "After regrouping how many hundreds did we have? (We had 1 hundred.) We write the 1 in the hundreds column in the example and then we add."

e.g.,

91	number of cards Louis has
+ 43	number of cards Maria has
134	number of cards in all

Say, "We have 1 hundred, 3 tens, and 4 ones. What is the sum? (The sum is 134.) How can we check our arithmetic? (We can change the order of the addends and add again. The order of the addends does not affect the sum.) What is the answer to the problem?" (Maria and Louis have 134 baseball cards in all.)

Repeat this procedure using other examples and ask the students to write the examples in their notebooks.

3.02.04.02 **add two 3-digit numbers with regrouping (exchange) tens to hundreds and check**

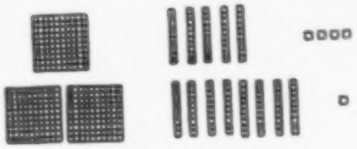
STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Write the following example on the chalkboard: 154.
+281

STRATEGY 1:
cont'd

Ask a student to read the example aloud. Say. "How many places are in each number? (There are three places in each number.) Which digits are in the ones place? (4 and 1 are in the ones place.) Which digits are in the tens place? (5 and 8 are in the tens place.) Which digits are in the hundreds place?" (1 and 2 are in the hundreds place.) Ask a student to display the appropriate squared material at the chalkboard as the other students do this at their desks.

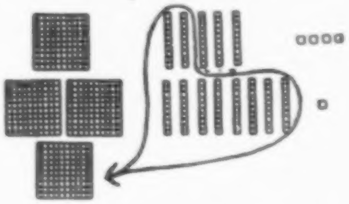
e.g.,

$$\begin{array}{r}154\\ \underline{+281}\end{array}$$



Say, "How many ones are there in all? (There are five ones in all.) Write the number 5 under the ones column in the sum, e.g., $\begin{array}{r}154.\\+281\\\hline 5\end{array}$ How many tens are there altogether? (There are 13 tens altogether.) Can we write 13 under the tens column? (No, we can only write one digit in each place.) How can we rename 13 tens?" (We can exchange 10 tens for 1 hundred.) Ask a student to demonstrate the exchange of 10 tens for 1 hundred as the other students do the exchange at their desks.

e.g.,



Say, "How many tens do we have now? (We have 3 tens.) Write the number 3 in the tens column in the sum and place a 1 at the top of the hundreds column. How many hundreds do we have? (We have four hundreds.) Write the number 4 in the hundreds column. What is the sum?" (The sum is 435.)

STRATEGY 1: cont'd

e.g.,

```
  /
 154
+281
 435
```

How can we check the answer?" (We can check the answer by using the commutative rule for addition. The order of the addends does not affect the sum.)

e.g.,

```
              check
  /             /
 154           281
+281          +154
 435           435
```

Repeat this procedure using other 3-digit numbers.

STRATEGY 2: Prepare a demonstration set of play money (dollars, dimes, and pennies). Say, "Phil and his sister went to the Ice Cream Palace. Phil spent $2.64 for a banana split. His sister spent $1.83 for a hot fudge sundae. How can we find how much they spent altogether?" (We can add to find the sum.) Ask a student to write the example on the chalkboard.

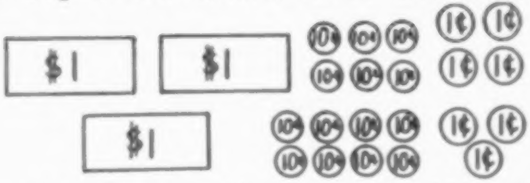
e.g.,

```
 $2.64 cost of banana split
+$1.83 cost of hot fudge sundae
```

Display the play money. Say, "Which money should we use to represent the digits in each place?" Ask a student to come to the chalkboard and represent $2.64 with the play money. Ask another student to come to the chalkboard and represent $1.83 with the play money.

e.g.,

```
 $2.64
+$1.83
```



Say, "Which coins will we add first? (We will add the pennies first.) Why? (Pennies represent ones because they are worth 1 cent each.) What do the dimes represent? (The dimes represent the tens place because they are each worth 10 cents.) What do the

STRATEGY 2: cont'd

dollars represent? (The dollars represent the hundreds place because each dollar is worth 100 cents.) How many pennies are there?" (There are seven pennies.) Ask a student to write a 7 in the ones column in the example. Say, "How many dimes are there? (There are 14 dimes.) Can we write the number 14 in the sum under the eight in the tens column? (No, you can only write one digit in each place.) What exchange can we make for the dimes?" (We can exchange 10 dimes for 1 dollar.) Ask a student to show the exchange at the chalkboard. Say, "How many dimes do we have now?" (We have four dimes.) Ask a student to write the number 4 in the sum in the tens column.) Say, "How many dollars do we have now?" (We have four dollars.) Ask student to write a 4 in the sum in the hundreds column. Say, "How much did they spend altogether? (They spent $4.47.) How can you check to be sure you are correct?" (We can reverse the addends and add again.) Ask a student to check it at the chalkboard as the other students solve the example and check it in their notebooks.

e.g.,

		check
$\$\overset{1}{2}.64$	cost of banana split	$\$\overset{1}{1}.83$
$\underline{+1.83}$	cost of hot fudge sundae	$\underline{+2.64}$
$4.47	total cost	$4.47

Say, "What is the answer to the problem?" (Phil and his sister spent $4.47 at the Ice Cream Palace.)

3.02.04.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard:

> Herman's parents own a grocery store on 41st Street. Yesterday they sold 83 sandwiches. Today they sold 54 sandwiches. How many sandwiches did they sell in all?

STRATEGY 1: cont'd

Say, "What are we asked to find in this problem? (We are asked to find how many sandwiches they sold altogether.) How do you know that? (I looked for words that gave hints. In this problem I found the words 'in all'.) Why is 'in all' a hint? (Words and phrases such as 'altogether' and 'in all' usually tell us to add.) Which information must you know to find the answer? (You must know the number of sandwiches sold each day.) Ask a student to write the example on the chalkboard and label it as the other students copy it into their notebooks.

e.g.,

 83 sandwiches sold yesterday
+54 sandwiches sold today

Say, "In which column will you begin? (We will begin to add in the ones column.) Is it necessary to exchange? (It is necessary to exchange because 8 tens and 5 tens equal 13 tens. You can only write one digit in each place. Therefore, you must exchange 10 tens for 1 hundred and write 3 tens in the tens column.) Where do you write the hundred?" (You write it in the hundreds column.)

e.g.,

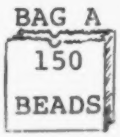
  83 sandwiches sold yesterday
+ 54 sandwiches sold today
 137 sandwiches sold in all

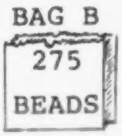
Say, "How can you be sure you are correct? (I can check the addition by switching the addends and adding again.) Why does that work?" (In addition, the order of the addends does not change the sum.) Ask the students to write the check into their notebooks alongside the original example, and label it, check. Say, "What is the answer to the problem?" (Herman's parents sold 137 sandwiches in all.)

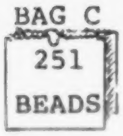
3.02.04

STRATEGY 2: Prepare and display bags of beads.

e.g.,







Write the following word problem on the chalkboard:

> Mrs. Arthur, the art teacher in Room 108, needs 526 beads for her 8 classes. Which two bags should she use so she has enough beads for her classes?

Ask a student to read it aloud. Say, "What are we asked to find? (We are asked to find out which bags Mrs. Arthur should use.) Is there any unnecessary information in this problem? (Her room number, 108, and the number of classes she has, 8, are not necessary to solve this problem.) What is necessary? (We must find out which two bags gave her the total of 526 beads.) Are there any hints? (Yes, I would look for the two bags which have a sum of 6 in the ones column.) How do you think that will help you? (I can begin with that partial sum because that is the same value shown in the ones place for the number 526.) Why is the 2 shown in the tens place?" (Using the number of beads in Bag B and Bag C, the sum of the tens is 12 tens. You must exchange 10 tens for 1 hundred, write a 2 in the tens place, and place a 1 above the hundreds column. This 1 represents 1 hundred.)

e.g.,

12	
275	number of beads in Bag B
+251	number of beads in Bag C
26	number of beads in all

Say, "How much is the sum in the hundreds place? (The sum is 5 hundreds.) What is the total? (The total is 526.)

STRATEGY 2: cont'd

e.g.,

$$\begin{array}{rl} 275 & \text{number of beads in Bag B} \\ +251 & \text{number of beads in Bag C} \\ \hline 526 & \text{number of beads in all} \end{array}$$

Can you convince me that BAG B (275) and BAG C (251) are the correct bags? (Yes, because if you add them in the reverse order, the answer is the same.) What is the reason for that?" (In addition, the order of the addends does not change the sum.)

e.g.,

$$\begin{array}{r} \underline{\text{check}} \\ 251 \\ +275 \\ \hline 526 \end{array}$$

Ask the students to write the example and the check in their notebooks. Say, "What is the answer to the problem?" (Mrs. Arthur should use Bags B and C for her 8 classes.)

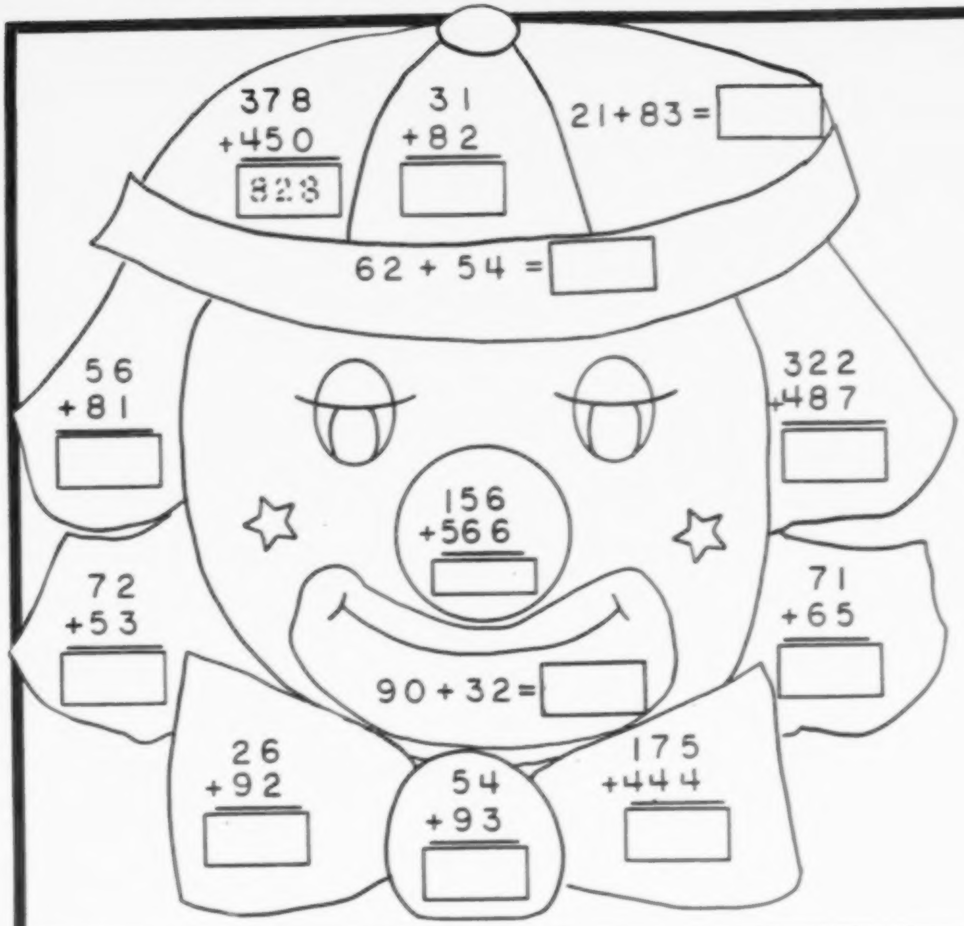
Repeat this procedure with other problems.

NOTE: See note in Getting Started 2.

P.O. 3.02.04.01 - .03

NAME: ______________________ CLASS: ________ DATE: ________

Add. Use the answer key to color the clown. Check your answers on a separate paper.


378
+450
828
31
+82
21+83 =
62 + 54 =
56
+81
322
+487
156
+566
72
+53
71
+65
90+32=
26
+92
54
+93
175
+444

★ Answer Key ★

Blue
828
147
104

★

Red
116
722
122

★

Green
113
118
619

★

Yellow
125
136
137
809

Solve and check.

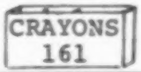
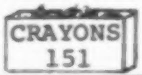
1. Jack, the candlestick maker, made 315 candles on Monday. He made 292 candles on Tuesday. How many candles did he make in all? solve check

Answer: ______________________

2. Mary had 375 lambs. She bought 154 more. How many lambs does she have altogether? solve check

Answer: ______________________

3. The art teacher in room 243 needed 344 crayons for all her classes. Which boxes should she use so that she has enough? solve check


CRAYONS
161

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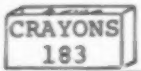

CRAYONS
183

Answer: ______________________

SHARPENING YOUR SKILLS

Units 30, 31, 32

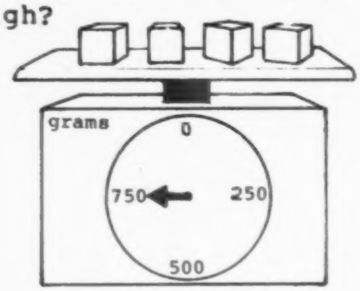
Name:____________________ **Class:** __________ **Date:**__________

1. One kilogram is equal in weight to ______.

ⓐ 1 milligram ⓒ 1000 lbs.

ⓑ 1000 grams ⓓ 1 liter

2. How much do these cubes weigh?



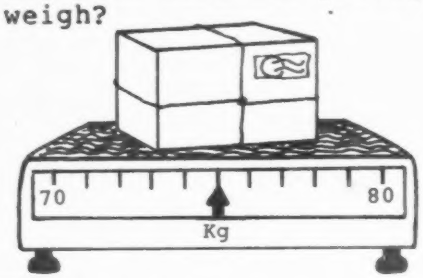
ⓔ more than 1 kilogram

ⓕ 750 grams

ⓖ 1 kilogram

ⓗ 750 kilograms

3. How much does the package weigh?



ⓐ 75 kilograms

ⓑ 75 grams

ⓒ more than 80 kilograms

ⓓ less than 70 kilograms

4. Which shows four tenths as a decimal?

$\frac{4}{10}$	4.0	0.4	410
ⓐ	ⓑ	ⓒ	ⓓ

5. Write the decimal form for each fraction.

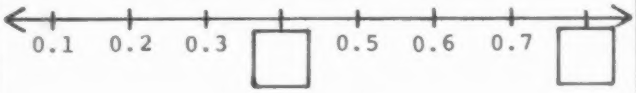
$\frac{3}{10}$ = ☐ $\frac{1}{10}$ = ☐ $\frac{7}{10}$ = ☐

6. 0.9 is the same as ______.

ⓔ nine ⓖ zero ninths

ⓕ ninety ⓗ nine tenths

7. Complete the number line.



8. Solve and check.

371 + 250 = ☐ check

9. The New York Visitors Bureau answered 183 calls between 9:00 A.M. and 10:00 A.M. Another 175 calls were answered between 10:00 A.M. and 11:00 A.M. How many calls were answered in the 2 hours?

_____ phone calls were answered.

3.03.04 SUBTRACTION OF 3-DIGIT NUMBERS WITH ONE REGROUPING (EXCHANGE) HUNDREDS TO TENS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.03.04.01A subtract 3-digit numbers with one regrouping (exchange) hundreds to tens and check;

e.g.,

$$\begin{array}{r} \overset{1}{\cancel{2}}\overset{14}{\cancel{4}}9 \\ -158 \\ \hline 91 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ {}^{1}91 \\ +158 \\ \hline 249 \end{array}$$

3.03.04.02B compute subtraction examples with one regrouping (exchange) having minuends to $9.99 and check;

e.g.,

$$\begin{array}{r} \$\overset{8}{\cancel{9}}.\overset{15}{\cancel{5}}0 \\ -5.70 \\ \hline \$3.80 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \$\overset{1}{3}.80 \\ +5.70 \\ \hline \$9.50 \end{array}$$

3.03.04.03A solve word problems related to skills learned in this module.

e.g.,

> The city to which Patrick is traveling is 209 miles from his home. He has already traveled 135 miles. How many more miles does he still have to travel?

VOCABULARY

TERMS

difference	left
more	exchange
less	regrouping

GETTING STARTED 1:

Prepare squared material (tens and ones). Write the following examples on the chalkboard:

$$\begin{array}{ccccc} \underline{A} & \underline{B} & \underline{C} & \underline{D} & \underline{E} \\ \begin{array}{r} 78 \\ \underline{-42} \end{array} & \begin{array}{r} 63 \\ \underline{-24} \end{array} & \begin{array}{r} 81 \\ \underline{-56} \end{array} & \begin{array}{r} 59 \\ \underline{-16} \end{array} & \begin{array}{r} 92 \\ \underline{-45} \end{array} \end{array}$$

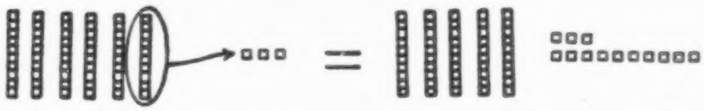
Say, "To solve some of these examples, we must regroup. Copy them into your notebook and circle the examples which require regrouping in order to solve them." Ask a student to demonstrate on the chalkboard.

e.g.,

$$\begin{array}{ccccc} \begin{array}{r} \underline{A} \\ 78 \\ \underline{-42} \end{array} & \boxed{\begin{array}{r} \underline{B} \\ 63 \\ \underline{-24} \end{array}} & \boxed{\begin{array}{r} \underline{C} \\ 81 \\ \underline{-56} \end{array}} & \begin{array}{r} \underline{D} \\ 59 \\ \underline{-16} \end{array} & \boxed{\begin{array}{r} \underline{E} \\ 92 \\ \underline{-45} \end{array}} \end{array}$$

Ask a student to use the squared material to demonstrate regrouping from tens to ones for example B.

e.g.,



Say, "Why must we regroup to solve this example?" (We must regroup 1 ten as 10 ones in order to subtract 24 from 63.) Ask a student to record the regrouping in the example and to complete the example.

e.g.,

$$\begin{array}{r} {}^{5\,13} \\ \cancel{6}\cancel{3} \\ \underline{-24} \\ 39 \end{array}$$

Repeat this procedure with the other examples which are circled. Remind the students to check their subtraction.

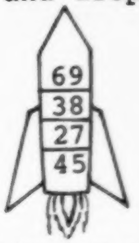
e.g.,

$$\begin{array}{cc} \underline{\text{solve}} & \underline{\text{check}} \\ \begin{array}{r} {}^{5\,13} \\ \cancel{6}\cancel{3} \\ \underline{-24} \\ 39 \end{array} & \begin{array}{r} {}^{1} \\ 39 \\ \underline{+24} \\ 63 \end{array} \end{array}$$

GETTING STARTED 2:

Prepare and display a rocket ship that displays 2-digit numbers.

e.g.,



Say, "Today we will send this rocket ship to the moon. For it to 'lift off,' all the numbers on the ship must be subtracted from the number 91. You will subtract and check your answers." Write the number 91 at the top of the ship. Say, "How can we subtract 69 from 91?" Ask a student to write his/her solution, explain the need to exchange, and write the check on the chalkboard.

e.g.,

$$\begin{array}{r} \overset{8}{\cancel{9}}\overset{11}{\cancel{1}} \\ -69 \\ \hline 22 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ 22 \\ +69 \\ \hline 91 \end{array}$$

Ask the students to complete the remaining problems in their notebooks in order to "lift off".

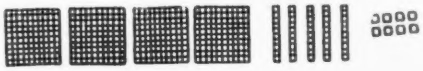
3.03.04

3.03.04.01 **subtract 3-digit numbers with one regrouping (exchange) hundreds to tens and check**

STRATEGY 1: Prepare squared material (hundreds, tens, and ones). On the chalkboard write $\begin{array}{r}458\\ \underline{-172}\end{array}$. Ask a student to show 458 using squared material.

e.g.,

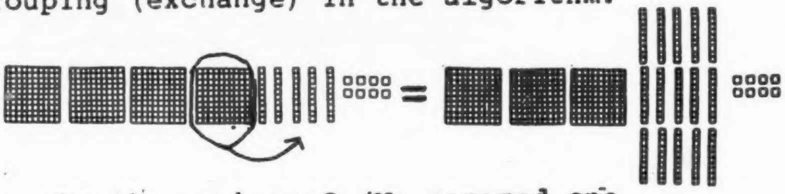
$$\begin{array}{r}458\\ \underline{-172}\end{array}$$



Say, "Can you subtract 2 ones from 8 ones? (Yes, there are enough ones.) Can you subtract 7 tens from 5 tens? (No, there are not enough tens.) How do you think we can get more tens?" (We can regroup 1 hundred for 10 tens.) Ask a student to demonstrate by using the squared material as another student records the regrouping (exchange) in the algorithm.

e.g.,

$$\begin{array}{r}\overset{3}{\cancel{4}}\overset{15}{\cancel{5}}8\\ \underline{-172}\\ 286\end{array}$$



Say, "How did we make the exchange? (We renamed one hundred as 10 tens.) When we renamed 1 hundred as 10 tens, how many tens did we have?" (We had 15 tens.) Ask a student to point to that in the algorithm. Say, "Now we can complete the subtraction. How can we check our subtraction?" (We can check the subtraction by adding the difference to the subtrahend.)

e.g.,

$$\begin{array}{r}\overset{3}{\cancel{4}}\overset{15}{\cancel{5}}8\\ \underline{-172}\\ 286\end{array} \qquad \begin{array}{r}\underline{\text{check}}\\ \overset{1}{2}86\\ \underline{+172}\\ 458\end{array}$$

Ask the students to write the example and the check in their notebooks.

Repeat this procedure with other examples.

3.03.04

STRATEGY 2: Write the following example on the chalkboard:

$$\begin{array}{rl} 854 & = \text{8 hundreds 5 tens 4 ones} \\ \underline{-291} & = \underline{\text{2 hundreds 9 tens 1 one}} \end{array}$$

Say, "When we subtract, in which place do we begin? (We begin to subtract in the ones place.) Can you subtract 1 one from 4 ones?" (Yes, there are enough ones.) Record the work in the algorithm. Say, "Can you subtract 9 tens from 5 tens? (No, there are not enough tens.) What must we do?" (We can regroup 1 hundred as 10 tens.) Demonstrate at the chalkboard as you regroup 1 hundred as 10 tens. Say, "Remember, 854 equals 8 hundreds, 5 tens, and 4 ones. We regroup 854 so that it is equal to 7 hundreds, 15 tens and 4 ones. Do we now have enough tens to subtract in the tens place?" (Yes, now there are enough tens.) Ask a student to come to the chalkboard and complete the subtraction as the other students record it in their notebooks. Say, "How did we know it was necessary to regroup in this example? (There were not enough tens.) How were we able to get more tens? (We regrouped 1 hundred for 10 tens.) How do we know the answer is correct?" (We can check our work by adding the difference to the subtrahend.) Demonstrate how addition and subtraction are related operations.

e.g.,

$$\begin{array}{r} \overset{7}{\cancel{8}}\overset{15}{\cancel{5}}4 \\ \underline{-291} \\ 563 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \overset{1}{5}63 \\ \underline{+291} \\ 854 \end{array}$$

3.03.04.02 **compute subtraction examples with one regrouping (exchange) having minuends to $9.99 and check**

STRATEGY 1: Prepare play money (one dollar bills, dimes, and pennies) for demonstration. Display pictures of sale items. Say, "Make believe you are a salesperson who

STRATEGY 1: cont'd

has been asked to reduce prices. Each item will cost $2.50 less. You must write the new selling price on the picture of each item."

e.g.,

Boat $6.49

Sale price_____

Book $5.25

Sale price_____

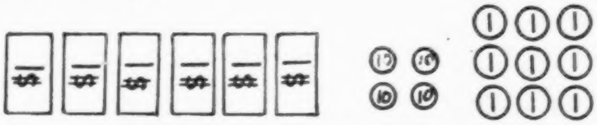
Glove $9.35

Sale price_____

Say, "How will the sale prices for the boat, the book, and the glove compare with the original prices? (The sale prices will be less.) How will you determine the sale prices? (We must subtract $2.50 from each original price.) We have learned to regroup hundreds for tens using squared material. How can we do this with money? (We can let the pennies represent the ones, the dimes represent the tens and the dollars represent the hundreds, but we must remember to place the dollar symbol and decimal point in the answer.) Let's determine the sale price of the boat." Model the subtraction algorithm at the chalkboard using the play money.

e.g.,

$$\begin{array}{r} \$\cancel{6}.\cancel{4}9 \\ \underline{-2.50} \end{array}$$

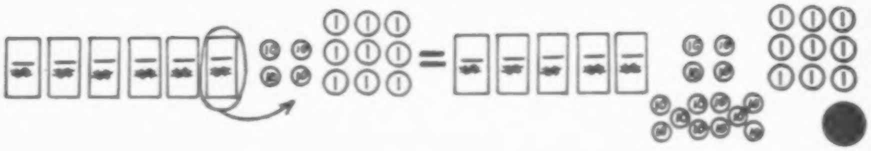


Say, "Can we subtract zero pennies from nine pennies? (Yes, there are enough pennies.) How much is 9 minus 0?" (9 minus 0 is 9.) Ask a student to write a 9 in the ones place in the difference. Say, "Can we subtract five dimes from four dimes? (No, we don't have enough dimes.) How can we continue the subtraction?" (We can continue to subtract by exchanging one dollar for ten dimes in the example and in the model.)

STRATEGY 1: cont'd

e.g.,

$$\begin{array}{r} {}^{5\ 14} \\ \$\cancel{6}.\cancel{4}9 \\ \underline{-2.50} \end{array}$$



Say, "$6.49 equals 6 dollars, 4 dimes and 9 pennies. When we exchanged 1 dollar for 10 dimes, we expressed $6.49 as 5 dollars, 14 dimes, and 9 pennies. Now that we have regrouped, do we have enough dimes?" (Yes, now there are enough dimes.) Ask a student to complete the subtraction. Say, "What is the sale price of the boat? (The sale price of the boat is $3.99.) How can we be sure the new selling price is correct?" (We can add the new selling price, which is the difference, to the amount of discount, which is the subtrahend. It should add up to the original price.)

e.g.,

$$\begin{array}{r} {}^{5\ 14} \\ \$\cancel{6}.\cancel{4}9 \\ \underline{-2.50} \\ \$3.99 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \$3.99 \\ \underline{+2.50} \\ \$6.49 \end{array}$$

Ask the students to write the example and the check in their notebooks.

STRATEGY 2: On the chalkboard write various subtraction examples with dollar and decimal symbols.

e.g.,

A	B	C
$ 6.58	$ 7.39	$ 5.75
-4.85	-1.98	-3.90

Say, "Look at example A. What must we do in order to subtract $4.85 from $6.58? (We must regroup by exchanging 1 hundred for 10 tens.) Why must we regroup? (The 8 in the tens place of the subtrahend is larger than the 5 in the tens place of the minuend.) What must we remember to write in the difference? (We must write the dollar and the decimal symbols.) Do we subtract differently when

STRATEGY 2: cont'd

these symbols are part of the example?" (No. We subtract as if the symbols were not there. Then we write them in the difference to show that we are subtracting money.)

Ask several students to solve and check the examples at the chalkboard as the other students write and solve them in their notebooks.

e.g.,

$$\begin{array}{rrr} A & B & C \\ \$\ \overset{5}{\cancel{6}}.\overset{15}{\cancel{5}}8 & \$\ \overset{6}{\cancel{7}}.\overset{13}{\cancel{3}}9 & \$\ \overset{4}{\cancel{5}}.\overset{1}{\cancel{7}}5 \\ -4.85 & -1.98 & -3.90 \\ \hline \$\ 1.73 & \$\ 5.41 & \$\ 1.85 \end{array}$$

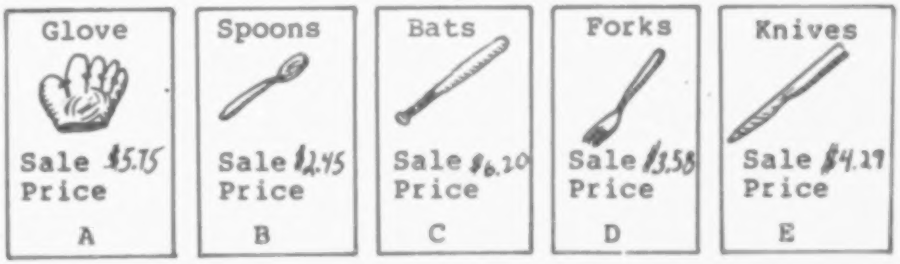
$$\begin{array}{rrr} \underline{\text{check}} & \underline{\text{check}} & \underline{\text{check}} \\ \$\ \overset{1}{1}.73 & \$\ \overset{1}{5}.41 & \$\ \overset{1}{1}.85 \\ -4.85 & -1.98 & -3.90 \\ \hline \$\ 6.58 & \$\ 7.39 & \$\ 5.75 \end{array}$$

Repeat this procedure with other examples.

3.03.04.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Prepare and display sale cards.

e.g.,



Say, "We have worked on subtraction with exchange of hundreds for tens. Let's see if we can solve some problems by regrouping where it is necessary. Look at the cards with utensils on sale. Each utensil is reduced in price by $1.84. I have only $2.00 to spend. Which ones can I afford to buy?" Ask the students to identify the cards with utensils. Say,

STRATEGY 1: cont'd

"How can I decide which utensil to buy? (I must subtract \$1.84 from the price of each utensil. If the sale price is less than \$2.00, I can buy that utensil.)

Ask 3 students to show the subtraction for each utensil at the chalkboard as the other students write and solve the example in their notebooks.

e.g.,

$$\begin{array}{r} \underline{\text{spoon}} \\ \$\overset{1}{\cancel{2}}.\overset{14}{\cancel{4}}5 \\ \underline{-1.84} \\ \$\ \ .61 \end{array} \qquad \begin{array}{r} \underline{\text{fork}} \\ \$\overset{2}{\cancel{3}}.\overset{15}{\cancel{5}}8 \\ \underline{-1.84} \\ \$1.74 \end{array} \qquad \begin{array}{r} \underline{\text{knife}} \\ \$\overset{3}{\cancel{4}}.\overset{12}{\cancel{2}}9 \\ \underline{-1.84} \\ \$2.45 \end{array}$$

Say, "Which utensils can I buy with \$2.00?" (You can buy the spoon or the fork.) Repeat this procedure with the remaining cards.

P.O. 3.03.04.01 & .03

NAME:______________________________ CLASS:__________ DATE:________

Subtract and check. Use the code to find the message.

What kind of pants do ghosts wear?

① $\begin{array}{r} \overset{6}{\cancel{7}}88 \\ -394 \\ \hline 394 \end{array}$ check

② $\begin{array}{r} 979 \\ -596 \\ \hline \end{array}$ check

③ $\begin{array}{r} 666 \\ -283 \\ \hline \end{array}$ check

④ $\begin{array}{r} 746 \\ -281 \\ \hline \end{array}$ check

⑤ $\begin{array}{r} 603 \\ -473 \\ \hline \end{array}$ check

⑥ $\begin{array}{r} 438 \\ -298 \\ \hline \end{array}$ check

⑦ $\begin{array}{r} 729 \\ -266 \\ \hline \end{array}$ check

⑧ $\begin{array}{r} 888 \\ -394 \\ \hline \end{array}$ check

130	494	394	140	383	465	463
E	S	B	A	O	J	N

___ ___ ___ ___ ___ ___ ___ ___

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

· Solve and check.

The students in room 230 collected 324 cans for recycling. The students in room 142 collected 181 cans for recycling. How many more cans were collected by the students in room 230?

Answer:____________________

Ellen, the baby elephant, weighs 153 pounds. Ernest, the baby elephant, weighs 228 pounds. What is the difference in their weights?

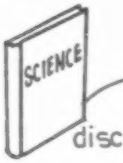
Answer:____________________

P.O. 3.03.04.01-.03

NAME: ______________________ CLASS: ________ DATE: ________

Subtract to find the sale price for each book. Check your answers.

BOOK SALE



4 15
$5.50
discount −3.70
sale price $1.80

check
$1.80
+3.70
$5.50

DICTIONARY

$6.25
discount − 2.70
sale price ________

check

$9.30
discount − 4.70
sale price ________

check

AROUND THE WORLD IN 80 DAYS

$7.35
discount −1.43
sale price ________

check

Use the table to help you solve the problems. Underline key words and check.

Cans Collected

	January	February	March	April
John's class	361	621	375	425
Susan's class	542	281	184	859

1. How many more cans did Susan's class collect in January than John's class?

Answer: In January Susan's class collected 181 more cans than John's class.

4 14
542
−361
181

check
181
+361
542

2. Susan's class collected more cans in January than in February. What is the difference in the amount collected in those months?

Answer: ______________________________

check

3. How many fewer cans were collected by John's class in March than in April?

Answer: ______________________________

check

3.02.05 ADDITION OF 3-DIGIT NUMBERS WITH TWO REGROUPINGS (EXCHANGES) ONES TO TENS, TENS TO HUNDREDS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.02.05.01A add two or more 3-digit numbers with two regroupings (exchanges), ones for tens, tens for hundreds and check;

e.g., check check

$$\begin{array}{rcrcrcr} 1\,1 & & 1\,1 & \qquad & 1\,1 & & 1\,1 \\ 263 & & 168 & & 242 & & 364 \\ +168 & & +263 & & 108 & & 108 \\ \hline 431 & \longleftrightarrow & 431 & & +364 & & +242 \\ & & & & \overline{714} & \longleftrightarrow & \overline{714} \end{array}$$

3.02.05.02B compute addition examples having sums to \$9.99 with two regroupings (exchanges) and check;

e.g., check

$$\begin{array}{r} 11 \\ \$1.83 \\ +2.48 \\ \hline \$4.31 \end{array} \qquad\qquad \begin{array}{r} 11 \\ \$2.48 \\ +1.83 \\ \hline \$4.31 \end{array}$$

3.02.05.03A solve word problems related to skills learned in this module.

e.g.,

Bill and Bob drove 394 miles in one day. On the next day they drove 116 miles. How many miles did they travel in all?

VOCABULARY

TERMS

decimal point	regroup
dollar sign	exchange

GETTING STARTED 1:

Set up a "store" in the classroom with items not to exceed $.50 in value, e.g., a pencil, a sharpener, a small notebook, ... Give each student or group of students play coins up to $.99 in value. Say, "You can 'buy' any item with the money you have. Write the names of the items you buy and the amount of money you spend for all the items." Ask some students to be cashiers and check the purchases of the other students.

Say, "Why did you buy only two or three items?" (I knew I had only 99¢ to spend.) What operation did you use to determine the amount of money you spent in all? (I used addition.) How did you know your answer was correct?" (I checked my addition by reversing the addends.)

GETTING STARTED 2:

Say, "Joey has 63 marbles. Jack gave Joey 49 more. How many marbles does Joey have now?"

Ask the students to write an example to solve the problem, then to estimate the answer, and finally to solve it, e.g.,

$$\begin{array}{r} {}^{\prime\,\prime} \\ 63. \\ +49 \\ \hline 112 \end{array}$$

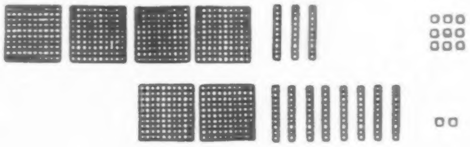
Say, "What is the answer to the problem? (Jerry now has 112 marbles.) Why did you use addition? (I knew that Joey would have more marbles than he started with. Addition made sense.) What kind of picture could you draw to solve this problem?" (I could draw Joey with 63 marbles. I could show Jack giving him 49 more marbles. Then I could count all the marbles.)

3.02.05

3.02.05.01 add two or more 3-digit numbers with two regroupings (exchange), ones for tens, tens for hundreds and check

STRATEGY 1: Prepare and distribute squared material to each student or group of students. Place a demonstration set of squared material near the chalkboard. Write an example on the chalkboard and ask the students to show each addend using the squared material as one student demonstrates with the squared material at the chalkboard.

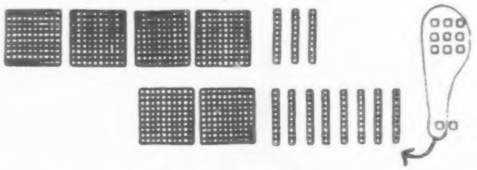
e.g.,



439
+282

Say, "Add the ones, the tens, and the hundreds. In which places must we regroup? (We must regroup in the ones and tens places.) Why?" (We can't show more than 9 in any place.) Ask a student to show the regrouping from ones to tens with the squared material and then to show the regrouping in the example as the other students work at their desks.

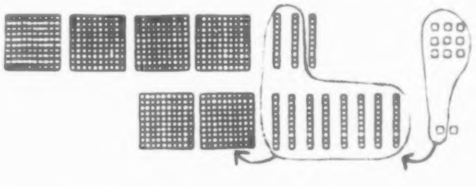
e.g.,



'
439
+282
1

Ask another student to show the regrouping from tens to hundreds with the squared material, to show the regrouping in the example and to complete the example.

e.g.,



' '
439
+282
721

Say, "How can we check the answer?" (We can check the answer by reversing the addends.) Ask a student to come to the chalkboard to check the example as the

STRATEGY 1: cont'd other students write and check the example in their notebooks.

Repeat this procedure using other examples with two or more addends.

STRATEGY 2: On the chalkboard write $\begin{array}{r}249.\\+179\\\hline\end{array}$ Ask the students to write the expanded forms of both addends in their notebooks. Then ask 2 students to write the expanded forms of both addends on the chalkboard.

e.g.,

2 hundreds + 4 tens + 9 ones
1 hundred + 7 tens + 4 ones

Say, "We will add these expanded numbers. What is the sum of 9 ones plus 4 ones? (9 ones plus 4 ones equals 13 ones.) Can we write 13 in the ones place? (No.) Why not?" (We can't show more than 9 in any place.) Ask a student to demonstrate how to exchange 13 ones for 1 ten and 3 ones. Say, "What is the sum of 4 tens + 7 tens + 1 ten? (The sum is 12 tens.) Can we write 12 in the tens place? (No, we must exchange 12 tens for 1 hundred and 2 tens and place the 1 hundred at the top of the hundreds column.) What is the sum of 2 hundreds plus 1 hundred plus 1 hundred?" (The sum is 4 hundreds.) Rewrite the example in standard form. Ask a student to demonstrate the exchange at the chalkboard and to check the example by reversing the addends.

e.g.,

$$\begin{array}{rcr} & & \underline{\text{check}} \\ 249 & & 174 \\ +174 & & +249 \\ \hline 423 & & 423 \end{array}$$

Say, "Why do we regroup from ones to tens and from tens to hundreds? (You can write only 1 digit in each place. If the sum in any column is more than 9 regrouping is needed.)

Repeat this procedure using other examples.

3.02.05

3.02.05.02 **compute addition examples having sums to $9.99 with two regroupings (exchanges) and check**

STRATEGY 1: Adapt Strategy 1 or Strategy 2, P.O. 3.02.04.02.

3.02.05.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write a word problem on the chalkboard.

e.g.,

Louis had $4.99. He earned $3.55.
How much money did Louis have altogether?

Say, "What does this problem tell us? (It tells us how much money Louis already had and how much money Louis earned.) What are you asked to find? (We must find how much money Louis had altogether.) How can we solve the problem?" (We can add to find the total.) Ask a student to write the appropriate example on the chalkboard as the other students write it in their notebooks. Ask another student to solve and check the examples as the other students do so in their notebooks.

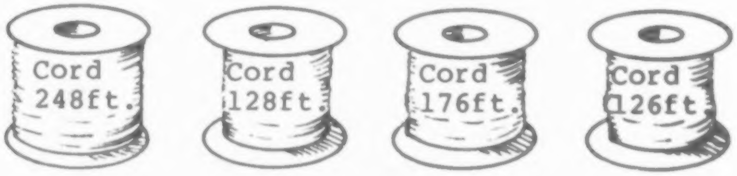
e.g.,

$$\begin{array}{r} \scriptstyle / \; / \\ \$4.99 \\ +3.55 \\ \hline \$8.54 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ \scriptstyle 1 \; 1 \\ \$3.55 \\ +4.99 \\ \hline \$8.54 \end{array}$$

Repeat this procedure using similar problems.

STRATEGY 2: Prepare and display pictures of rolls of cord.

e.g.,



STRATEGY 2: cont'd

Write the following word problem on the chalkboard:

> Pedro's father was building a fence around his yard. He needed 424 feet of cord to go around the perimeter of the yard. Which two rolls of cord should he use?

Say, "What does this problem tell us? (It tells us he needed 424 feet of cord to go around the perimeter of the yard.) What does perimeter mean? (The perimeter is the distance around the yard. It is the place where you would build the fence around the property.) What are we asked to find? (We are asked to find which two rolls of cord add up to 424 feet.) How would you solve it?" (I would try two rolls of cord in which the sum in the ones column equals four and the sum in the tens column equals two.)

e.g.,

$$
\begin{array}{r} \underline{\text{A}} \\ {\scriptstyle 1} \\ 128 \\ +\underline{176} \\ 04 \end{array}
\qquad\qquad
\begin{array}{r} \underline{\text{B}} \\ {\scriptstyle 1} \\ 128 \\ +\underline{126} \\ 54 \end{array}
\qquad\qquad
\begin{array}{r} \underline{\text{C}} \\ {\scriptstyle 1} \\ 248 \\ +\underline{176} \\ 24 \end{array}
$$

Say, "Which examples can we eliminate? (We can eliminate examples A and B) Why?" (Although examples A and B have sums of 4 in the ones place, they are not correct. The sum in the tens place is not two.) Ask a student to complete and check example C.

e.g.,

$$
\begin{array}{r} \underline{\text{C}} \\ {\scriptstyle 1\,1} \\ 248 \\ +\underline{176} \\ 424 \end{array}
\qquad\qquad\qquad
\begin{array}{r} \underline{\text{check}} \\ {\scriptstyle 1\,1} \\ 176 \\ \underline{248} \\ 424 \end{array}
$$

Say, "What is the answer to the problem? (The first and the third rolls will provide enough cord to go around the perimeter of the yard.) What did we have to do in the ones place to add correctly? (We had to regroup 10 ones for 1 ten. We can have only 1 digit in each place.) What did we do in the tens place?" (We regrouped 10 tens for 1 hundred.)

Repeat this procedure using similar problems.

P.O. 3.02.05.01&.03

NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

Do you know the famous person? Solve each example and check. Find each answer in the name and write the letter of the example on the line.

1 1 343 +269 612 check 269 +343 K	127 +483 check H	414 +187 check D
312 162 +159 check C	519 +286 check E	123 378 +245 check O

FAMOUS PERSON

		K			
805	601	612	746	633	610

Solve each problem. Check your answer.

On Saturday 356 circus tickets were sold. On Sunday 285 tickets were sold. How many tickets were sold on both days?

Answer: ______________________

____

check

356 +285

285 +356

John sold 227 boxes of popcorn. Jimmy sold 336 boxes of popcorn. How many boxes of popcorn did both boys sell?

Answer: ______________________

____

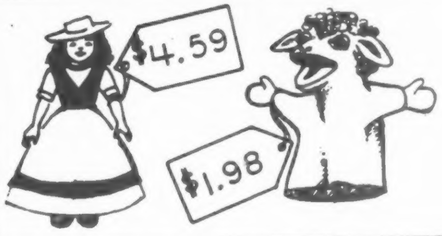
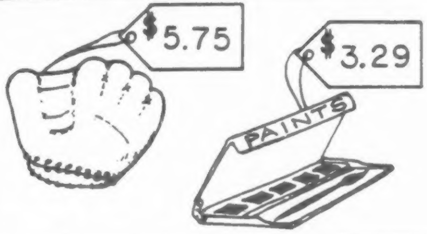
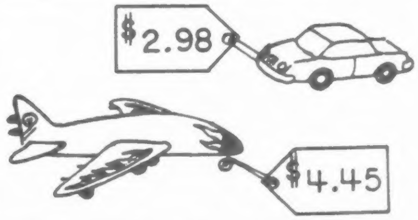
check

P.O. 3.02.05.02,.03

NAME: ______________________ CLASS: ________ DATE: ________

Follow the directions below.

How much does each group of toys cost? Solve and check your answers.

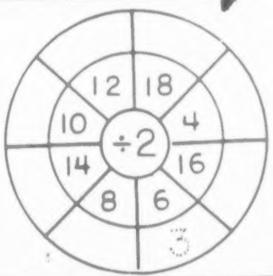
	solve	check
	$4.59 +1.98	
 $5.75 $3.29 PAINTS		
		

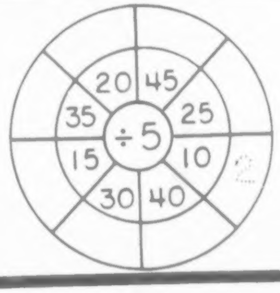
Solve each problem. Check your answer.

	solve	check
Mark sold 216 soft drinks. Mary sold 394 soft drinks. Ted sold 162 soft drinks. How many soft drinks were sold in all?		
The clown gave 438 balloons to the youngsters on Saturday. He gave 299 balloons to the youngsters on Sunday. How many balloons did he give out during the weekend?		

Do you remember?

Complete the division wheels.


÷2
12
18
4
16
6
8
14
10


÷5
20
45
25
10
40
30
15
35

SHARPENING YOUR SKILLS

Units 33, 34

Name: ______________________ **Class:** __________ **Date:** __________

1. On Monday, Careless Carol left the house with $3.92. She lost $1.43. How much money did she have when she got home?

   Carol had______.

2. On Tuesday, Careless Carol left her house with $8.16. The ice cream she dropped in the street cost $1.25. How much money did she have left?

   Carol had ______ left.

3. On Wednesday, Careless Carol left the house with $9.65. She spent $4.91 on a poster which blew away in the wind. With how much money did she return home?

   Carol returned with ______.

4. On Thursday and Friday Careless Carol stayed in bed because she had already lost $______ that week.

5. Billy traveled to Washington, D.C. to visit his uncle Ronald. To get there he drove 362 miles on Saturday and 289 miles on Sunday. How far away does Uncle Ronald live?

   Uncle Ronald lives_____miles away.

6. Solve.

   $$\begin{array}{r} 853 \\ \underline{-180} \end{array}$$

   ⓐ 733 ⓒ 673
   ⓑ 753 ⓓ 633

   $$\begin{array}{r} \$3.98 \\ \underline{+1.79} \end{array}$$

   ⓔ $5.77 ⓖ $56.17
   ⓕ $4.67 ⓗ $4.77

7. Solve and check.

   $$\begin{array}{r} 345 \\ \underline{-174} \end{array}$$

   check

   $$\begin{array}{r} \$4.89 \\ \underline{-2.98} \end{array}$$

   check

Unit 35

3.03.05 SUBTRACTION OF 3-DIGIT NUMBERS WITH TWO REGROUPINGS (EXCHANGES) TENS TO ONES AND HUNDREDS TO TENS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

3.03.05.01A subtract 3-digit numbers with two regroupings (exchanges), tens to ones, hundreds to tens and check;

e.g.,

$$\begin{array}{r} {}^{3}\,{}^{15}\,{}^{13} \\ \cancel{4}\cancel{6}\cancel{3} \\ -\ 278 \\ \hline 185 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ {}^{\prime}\,{}^{\prime}\ \ \\ 185 \\ +\ 278 \\ \hline 463 \end{array}$$

3.03.05.02B compute subtraction examples with two regroupings (exchanges) having minuends to $9.99 and check;

e.g.,

$$\begin{array}{r} {}^{8}\ \ {}^{13}\,{}^{13} \\ \$\cancel{9}.\cancel{4}\cancel{3} \\ -\ 4.79 \\ \hline \$4.64 \end{array} \qquad\qquad \begin{array}{r} \underline{\text{check}} \\ {}^{\prime}\ {}^{\prime}\ \ \\ \$4.64 \\ +\ 4.79 \\ \hline \$9.43 \end{array}$$

3.03.05.03A solve word problems related to skills learned in this module.

e.g.,

> To participate in the celebration for the Statue of Liberty, sailors arrived in New York City on tall ships. 935 sailors came from Europe. 786 sailors came from South America. How many more sailors came from Europe than from South America?

3.03.05

VOCABULARY

TERMS

difference	regroup
minuend	exchange
subtrahend	digit

GETTING STARTED 1:

Divide the students into 2 groups. Say, "I will say a number, e.g., 8. 8 will be the difference for the subtraction facts you will write. Write as many different subtraction facts with a difference of 8 as you can until I say stop. The team with the greatest number of subtraction facts will be the winner."

e.g.,

The number is 8. The subtraction facts are:

17 - 9 = 8   16 - 8 = 8   15 - 7 = 8   14 - 6 = 8
10 - 2 = 8   9 - 1 = 8   12 - 4 = 8   11 - 3 = 8 . . .

GETTING STARTED 2:

On the chalkboard write the following word problems:

- A 57 mile bicycle race began on Long Island and ended in Brooklyn. After riding 34 miles, several cyclists stopped for lunch. How many more miles did these cyclists ride to finish the race?
- The N.Y. Mets play 162 games in a season. They play 81 games at home. How many games are played away from home?

Ask the students to read the problems and determine how they can be solved. Say, "In your notebooks write the examples which will help you solve these problems. Circle the example which requires regrouping in order to solve it."

e.g.,

$$\begin{array}{r} 57 \\ \underline{-\ \ 4} \end{array} \qquad \bigcirc\!\!\begin{array}{r} 162 \\ \underline{-\ 81} \end{array}$$

Ask a student to explain why one of the examples requires regrouping while the other does not.

3.03.05

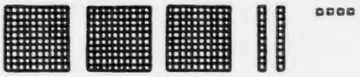
3.03.05.01 subtract 3-digit numbers with two regroupings (exchanges), tens to ones, hundreds to tens and check

STRATEGY 1: Prepare and distribute squared material, (hundreds, tens, and ones) to each student or group of students. Write the following example on the chalkboard.

e.g.,
$$\begin{array}{r} 324 \\ \underline{-145} \end{array}$$

Ask a student to identify the minuend and to represent it with the squared material as the other students do the same at their desks.

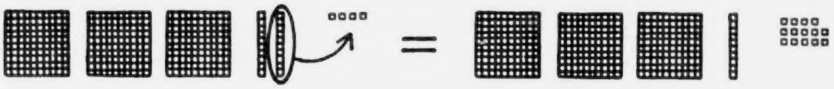
e.g.,



$$\begin{array}{r} 324 \\ \underline{-145} \end{array}$$

Say, "Can we subtract 145 from 324? Explain. (We can subtract 145 from 324 because 324 is greater than 145.) Now look at the digits in the ones and the tens places. What do you notice? (The digits in the ones and the tens places of the subtrahend are larger than the digits in the ones and the tens places of the minuend.) What must we do in order to subtract in these places? (We must regroup.) Let's use our squared material to show the regrouping. Since we cannot take 5 away from 4 what must we do?" (We must exchange 1 ten for 10 ones.)

e.g.,



$$\begin{array}{r} 324 \\ \underline{-145} \end{array}$$

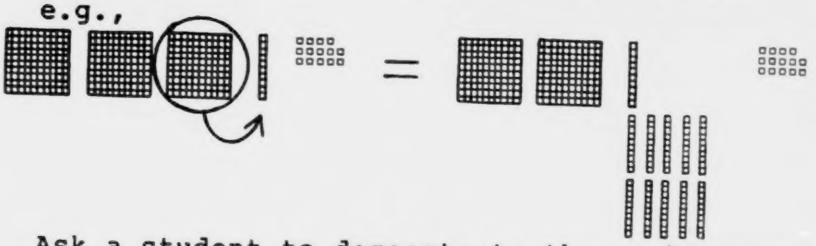
Ask a student to demonstrate the exchange and to subtract in the ones column as the other students work in their notebooks.

e.g.,
$$\begin{array}{rrrr} & 3 & \overset{1}{\cancel{2}} & \overset{14}{\cancel{4}} \\ - & 1 & 4 & 5 \\ \hline & & & 9 \end{array}$$

STRATEGY 1: cont'd

Say, "Look at the tens column. Why can't we subtract in the tens column? (There are 4 tens in the subtrahend and only 1 ten in the minuend. 4 cannot be subtracted from 1.) What must we do? (We must exchange 1 hundred for 10 tens.) Let's use our squared material to show the regrouping."

e.g.,



$$\begin{array}{cccc} & & 1 & 14 \\ & 3 & \cancel{2} & \cancel{4} \\ - & 1 & 4 & 5 \\ \hline & & & 9 \end{array}$$

Ask a student to demonstrate the exchange and to subtract in the tens column as the other students work in their notebooks.

e.g.,

$$\begin{array}{cccc} & & 11 & \\ & 2 & \cancel{1} & 14 \\ & \cancel{3} & \cancel{2} & \cancel{4} \\ - & 1 & 4 & 5 \\ \hline & & 7 & 9 \end{array}$$

Say, "Why can we now subtract in the hundreds column without any exchange?" (1 can be subtracted from 2.) Ask a student to complete the example at the chalkboard as the other students complete it in their notebooks.

e.g.,

$$\begin{array}{cccc} & & 11 & \\ & 2 & \cancel{1} & 14 \\ & \cancel{3} & \cancel{2} & \cancel{4} \\ - & 1 & 4 & 5 \\ \hline & 1 & 7 & 9 \end{array}$$

Say, "Why did we exchange 1 hundred for 10 tens and 1 ten for 10 ones?" (The digits in the ones and tens places of the subtrahend were greater than the digits in the ones and tens places of the minuend. In order to subtract, we had to exchange.)

Ask a student to check the subtraction.

STRATEGY 1: cont'd

e.g.,

$$\begin{array}{rrrr} & & 11 & \\ & 2 & \cancel{1} & 14 \\ & \cancel{3} & \cancel{2} & \cancel{4} \\ - & 1 & 4 & 5 \\ \hline & 1 & 7 & 9 \end{array} \qquad \begin{array}{rrrr} \multicolumn{4}{r}{\underline{\text{check}}} \\ & 1 & 1 & \\ & 1 & 7 & 9 \\ + & 1 & 4 & 5 \\ \hline & 3 & 2 & 4 \end{array}$$

Repeat this procedure with other examples.

STRATEGY 2: Prepare and distribute lined paper to each student. Demonstrate as you say, "Fold your paper into 3 columns. Label the columns **hundreds, tens**, and **ones.**" Demonstrate at the chalkboard.

e.g.,

hundreds	tens	ones

Ask a student to write the digits for the number 531 in the appropriate place value columns as the other students write the digits on their papers. Say, "In which column did you write the 5? ...3? ...1?" (The 5 was written in the hundreds column, the 3 was written in the tens column, and the 1 was written in the ones column.) Ask another student to write the digits for the number 286 in the appropriate columns beneath 531. Say, "In which column did you write the 2? ...8? ...6?" (The 2 was written in the hundreds column, the 8 was written in the tens column, and the 6 was written in the ones column.) Write a minus symbol to the left of 286 and draw a line beneath these numbers.

e.g.,

hundreds	tens	ones
5	3	1
-2	8	6

Say, "In which column do we begin subtracting? (We begin subtracting in the ones column.) Can we subtract 6 ones from 1 one? (We cannot subtract 6

STRATEGY 2: cont'd

ones from 1 one.) Why not? (There are not enough ones.) What must we do? (We must exchange 1 ten for 10 ones.) If we exchange 1 ten for 10 ones, how many tens will be left? (There will be 2 tens left.) How many ones will we have now. (We will have 11 ones.) Show the exchange in your example."

e.g.

hundreds	tens	ones
5	$\overset{2}{\cancel{3}}$	$\overset{11}{\cancel{1}}$
-2	8	6

Say, "Now subtract 6 from 11 in the ones column. How many ones are left? (5 ones are left.) Write the difference in the ones column. Let's subtract in the tens column. Since we cannot subtract 8 tens from 2 tens what must we do? (We must exchange 1 hundred for 10 tens.) How many hundreds will we have left after the exchange? (We will have 4 hundreds left.) How many tens will we have left? (We will have 12 tens left.) Show the exchange in your example."

e.g.,

hundreds	tens	ones
$\overset{4}{\cancel{5}}$	$\overset{12}{\cancel{3}}$	$\overset{11}{\cancel{1}}$
-2	8	6
		5

Say, "How much is 12 tens minus 8 tens? (12 tens minus 8 tens equals 4 tens.) Write the difference in the tens column. Let's go to the hundreds column. Can we subtract the hundreds? (Yes.) How much is 4 hundreds minus 2 hundreds? (4 hundreds minus 2 hundreds equals 2 hundreds.) Write the difference in the hundreds column. Look at the whole example. How much is 531 minus 286?" (531 minus 286 equals 245.)

3.03.05

STRATEGY 2: e.g.,
cont'd

hundreds	tens	ones
$\overset{4}{\cancel{5}}$	$\overset{\overset{12}{\cancel{2}}}{\cancel{3}}$	$\overset{11}{\cancel{1}}$
−2	8	6
2	4	5

Ask a student to check the subtraction at the chalkboard as the other students check it in their notebooks.

e.g.,

$$\begin{array}{r} \overset{4}{\cancel{5}}\ \overset{\overset{12}{\cancel{2}}}{\cancel{3}}\ \overset{11}{\cancel{1}} \\ -\ 2\ 8\ 6 \\ \hline 2\ 4\ 5 \end{array} \qquad \begin{array}{r} \underline{\text{check}} \\ \overset{1}{2}\ \overset{1}{4}\ 5 \\ +\ 2\ 8\ 6 \\ \hline 5\ 3\ 1 \end{array}$$

3.03.05.02 **compute subtraction examples with two regroupings (exchanges) having minuends to $9.99 and check**

STRATEGY 1: Adapt Strategies 1 and 2, P.O. 3.03.02.02.

3.03.05.03 **solve word problems related to skills learned in this module**

STRATEGY 1: Write the following word problem on the chalkboard:

> On July 3rd of Liberty Weekend, 478 fireworks exploded around the Statue of Liberty. On July 4th, 913 fireworks exploded around the Statue of Liberty and above the Hudson and East Rivers. On July 5th, 380 fireworks exploded above the Great Lawn during the concert in Central Park. How many more fireworks exploded on July 4th than on July 3rd?

Say, "This word problem has a lot of information. To solve it, we must read carefully and decide which information is needed and which is not." Ask the students to read the problem and to decide which

STRATEGY 1: cont'd

information is needed to solve the problem. Ask a student to underline the information which is needed to solve the problem.

e.g.,

...478 fireworks exploded...

...913 fireworks exploded...

Say, "Why didn't you underline the other information? (The question asks only about the fireworks which exploded on July 3rd and July 4th.) How will we solve the problem?" (We will solve the problem by subtracting because we are comparing one amount with another amount.) Ask a student to write the appropriate subtraction example on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{rl} 9\ 1\ 3 & \text{number of fireworks on July 4th.} \\ -\ 4\ 7\ 8 & \text{number of fireworks on July 3rd.} \\ \hline \end{array}$$

Elicit that two regroupings will be necessary. Review the steps for subtraction of 3-digit numbers with two regroupings as described in Strategies 1 and 2, P.O. 3.03.05.01.

Ask a student to complete the subtraction at the chalkboard as the other students complete it in their notebooks.

e.g.,

$$\begin{array}{rl} \overset{8}{\cancel{9}}\ \overset{10}{\cancel{1}}\ \overset{13}{\cancel{3}} & \text{number of fireworks on July 4th.} \\ -\ 4\ 7\ 8 & \text{number of fireworks on July 3rd.} \\ \hline 4\ 3\ 5 & \text{difference in number of fireworks} \\ & \text{exploded on July 3rd and 4th.} \end{array}$$

Say, "How many more fireworks exploded on July 4th than on July 3rd?" (435 more fireworks exploded on July 4th.)

Repeat this procedure with other word problems.

P.O. 3.03.05.01&.03

NAME: ______________________________ **CLASS:** __________ **DATE:** __________

Solve and check the examples and word problems below.

1. **solve** **check** 435 −267	2. **solve** **check** 651 −388	3. **solve** **check** 436 −198
4. **solve** **check** 945 −689	5. **solve** **check** 327 −168	6. **solve** **check** 552 −386
7. **solve** **check** 244 −175	8. **solve** **check** 636 −188	9. **solve** **check** 846 −278

10. Guidebooks to New York City are sold by street vendors. A vendor at Times Square sold 482 guidebooks. A vendor at the South Street Seaport sold 623 guidebooks. A vendor at the United Nations Building sold 365 guidebooks. How many more guidebooks were sold by the South Street Seaport vendor than by the United Nations vendor?

solve **check**

Answer: ______________________________

11. A public library in the Bronx has 384 fairy tales on the shelves. A public library in Queens has 923 fairy tales on the shelves. What is the difference in the number of fairy tales in the two libraries?

solve **check**

Answer: ______________________________

P.O. 3.03.05.02-.03

NAME: ____________________ **CLASS:** ________ **DATE:** ________

Solve and check the examples and word problems below.

solve check $ 5.25 − 2.76 $.	solve check $ 8.32 − 5.45 $.	solve check $ 6.15 − 2.68 $.
solve check $ 9.33 − 4.75 $.	solve check $ 5.28 − 1.69 $.	solve check $ 9.62 − 2.74 $.

7. The regular price for a concert ticket to Madison Square Garden is $8.75. Carla bought a discounted ticket for $6.98. What is the difference in prices?

Answer: ____________________

solve check

8. Hannah went to Chinatown with $9.25. She spent $4.79 on a toy dragon. How much money did she have left?

Answer: ____________________

solve check

CHALLENGE!

1,246 students were graduated from a high school in Manhattan. 328 students will attend college in New York State. 649 students will attend college in New York City. The other students will get jobs. How many students will get jobs?

Answer: ____________________

Unit 36

3.10.06 INCH, FOOT, YARD

(3 lessons)

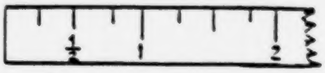
PERFORMANCE OBJECTIVES

The student will be able to...

*3.10.06.01A measure objects less than a foot in length to the nearest inch and record using the symbol for inch (");

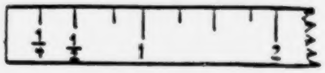
3.10.06.02A identify $\frac{1}{2}$ inch on a ruler and measure objects to the nearest $\frac{1}{2}$ inch;

e.g.,



3.10.06.03A identify $\frac{1}{4}$ inch on a ruler and measure objects to the nearest $\frac{1}{4}$ inch;

e.g.,



*3.10.06.04A identify a foot as a unit of length and measure objects to the nearest foot;

e.g.,

How long is the teacher's desk to the nearest foot?

*3.10.06.05A identify a yard as a unit of length and measure objects to the nearest yard;

e.g.,

How long is our classroom to the nearest yard?

3.10.06.06A identify the numerical relationships among inch, foot, and yard.

e.g.,

12 inches = 1 foot

3 feet = 1 yard

36 inches = 1 yard

VOCABULARY

TERMS

measure
inch
foot
yard
ruler

GETTING STARTED 1:

Divide the class into small groups. Ask each group to measure various objects using non-standard measures, e.g., measure the width of a table using hands as both the instrument and the unit of measure. Ask each child in the group to measure at least one object. Be sure that each group measures the same items using the same measures, e.g., one group will measure the width of the table using their hands.

Draw a chart on the chalkboard.
e.g.,

HOW MANY HANDS WIDE IS YOUR TABLE?

		Number of Hands				
		1	2	3	4	5
Name	Anna				✓	
	Paul			✓		
	Carlos				✓	

Compare the results. Say, "Why is Paul's measurement different? (Paul's hand may be larger.) Since people have hands of different sizes, hands are not reliable units of measure. What could we use to measure the table so that the results will always be the same?" (We could use a straw, an ice cream stick, or a chalkboard eraser as our unit of measure. If we all use an ice cream stick as our unit of measure,the groups will then have the same answer.) What are some standard measuring tools that measure length?" (A ruler, a yardstick, a tapemeasure, or a meterstick measure length.) Accept any other reasonable response.

GETTING STARTED: 2

Prepare and distribute several one inch cardboard strips to each student or group of students. Say, "Can you guess how many of these cardboard strips will fit across your math workbook?" Write several of the students' estimates on the chalkboard. Say, "Now place the strips end to end across your workbook to measure it." Write the actual measurement on the chalkboard. Say, "Whose estimate came the closest to the actual measurement?"

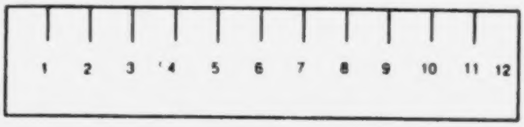
Repeat this procedure for other objects in the classroom.

3.10.06

3.10.06.01 **measure objects less than a foot in length to the nearest inch and record using the symbol for inch (")**

STRATEGY 1: Prepare several lengths of colored paper which have been cut to measure 1 inch, 2 inches, 3 inches ... 12 inches. Prepare and distribute to each student or group of students several objects, e.g., straws, ice-cream sticks, pipe cleaners and a 12-inch ruler with 1-inch markings. Say, "We can measure objects in different ways. What do we use to determine the length of an object?" (To determine the length of an object we can use a ruler.) Tape a ruler, calibrated in inches, to the chalkboard. Elicit that the number 1 is a distance of 1 inch from the left edge of the ruler and that, when measuring, the left edge of each strip must be placed on the left edge of the ruler.

e.g.,



Ask the students to first estimate the lengths of the objects and then to use this chalkboard ruler to measure their lengths. Say, "How long is the red strip?" (The red strip is 3 inches long.) On a chart record the estimated and the actual lengths of the objects using the symbol for inch.

e.g.,

Item	Estimate	Actual Length to the Nearest Inch
red strip	4"	3"

Point to the symbol for inch (") and say, "Just as we have special symbols for a dollar or a degree, we have a special symbol for an inch. Why do we use this symbol? (It is faster to write the symbol

STRATEGY 1: cont'd

than the word.) As we continue to measure the objects and colored strips to the nearest inch, we will complete the chart using the symbol for inch."

Repeat this procedure with the other colored objects and colored strips. Say, "When the length of the strip is more or less than full inches, we will record its length to the nearest inch." Estimate and measure several strips and objects and record the estimates and actual lengths to the nearest inch on the chart. Ask the students to make a chart in their notebooks and to estimate, then measure and record the lengths of the objects which they have received. When the students have completed their charts ask them to exchange objects, estimate, measure, record, and compare their results.

STRATEGY 2:

Distribute a 12 inch ruler to each student. Say, "When we measure we must decide what we want to know about the object we will measure." Display a book. Say, "In what ways can this book be measured? (We can weigh the book on a scale to measure its weight. We can use a ruler to measure its length, width, or thickness.) If we want to measure its length, width, or thickness, we must choose the correct unit of measurement." Use extreme examples to show why the appropriate unit of measure is important. Say, "What unit of measure would we use to determine the distance from here to China? Why? (The distance would be measured in miles because it is very far and miles are used to measure great distances.) What unit of measure would we use to determine the length of your math book? Why?" (We would use inches because it is small.) Ask the students to use their rulers to measure and to record to the nearest inch the

STRATEGY 2: cont'd

lengths of objects which they have in common, such as textbooks, workbooks, or looseleaf sheets. Demonstrate on the chalkboard.

e.g.,

Object	Estimate	Length of Object To the Nearest Inch
math textbook	7 inches	8 inches
math workbook	10 inches	10 inches
looseleaf paper	11 inches	10 inches

Say, "Sometimes a symbol is used instead of a word. Do you know any symbols? Accept appropriate answers such as $ for dollar, = for equal, and ÷ for division. Say, "There is a symbol we use to replace the word inch." Write the symbol for inch on the chart in the same column as Length of Object To The Nearest Inch.

e.g.,

Object	Estimate	Length of Object To the Nearest Inch
math textbook	7 inches	8 inches or 8"

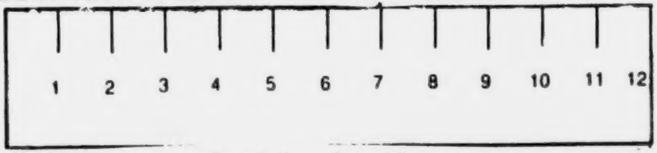
Ask the students to compare the results of their measurements. Where there is a discrepancy, ask them to discuss what might have happened and to remeasure the object.

3.10.06.02 **identify $\frac{1}{2}$ inch on a ruler and measure objects to the nearest $\frac{1}{2}$ inch**

STRATEGY 1: Prepare and distribute to each student or group of students a 12 inch ruler with 1 inch markings and a 12 inch ruler with 1 inch and $\frac{1}{2}$ inch markings. Say, "How are these rulers the same? (They are both 12 inches long.) How are these rulers different?" (One ruler has 1 inch markings and the other has

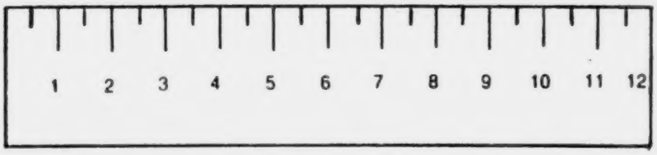
STRATEGY 1: 1 inch and $\frac{1}{2}$ inch markings.) Draw a fascimile on the chalkboard marked off in inches.

e.g.,



Say, "Let's pretend this is the same as one of your rulers. What is the unit of measure on this ruler? (The unit of measure is the inch.) If I divide the inch into 2 equal parts what would we call the new marking between each inch marking?" (The new marking on the ruler would be the half inch.) Demonstrate by adding $\frac{1}{2}$-inch markings to the ruler on the chalkboard.

e.g.,



Say, "Why would we need a ruler with half inch markings? (A ruler with half inch markings helps us to measure more exactly.) When using a 12-inch ruler, if an object is on or close to a half-inch marking we say that it is one and a half or two and a half ... eleven and a half inches long." Ask the students to measure several objects to the nearest $\frac{1}{2}$ inch, name the objects, and record the results on a chart in their notebooks.

e.g.,

OBJECTS MEASURED TO THE NEAREST $\frac{1}{2}$ INCH

Object	Estimate	Length
pencil	5"	5 $\frac{1}{2}$"
height of cup	3"	4"
finger	3"	2 $\frac{1}{2}$"

Say, "When objects are measured to the nearest half inch they can be closest to the whole inch or to the half inch between two whole numbers. For example, although the height of the cup is between

STRATEGY 1: cont'd

four inches and four and a half inches, it is closer to four inches. Therefore we say it is about four inches high."

Ask the students to measure one another's objects and to compare their measurements.

3.10.06.03 **identify $\frac{1}{4}$ inch on a ruler and measure objects to the nearest $\frac{1}{4}$ inch**

STRATEGY 1:

Prepare and distribute to each student or group of students a 12 inch ruler with 1 inch markings, a 12 inch ruler with $\frac{1}{4}$ inch markings and 3 strips of paper, $3\frac{1}{4}$", $6\frac{1}{4}$", and $9\frac{3}{4}$ inches long. Draw facsimilies of both rulers on the chalkboard. Say, "When we divided the inch into 2 equal parts, what did we call each part? (Each part was called $\frac{1}{2}$ inch.) How was each $\frac{1}{2}$ inch shown on the ruler?" (The half inch lines were shorter than the 1 inch lines.) Ask the students to place 1 ruler on the top of the other as you demonstrate. Say, "How are these rulers different? (The top ruler shows inches. The bottom ruler shows inches divided into 4 equal parts.) What fractional name could we call each part? (Each part could be called $\frac{1}{4}$ inch.) How are quarter inches shown on the ruler? (Quarter inches are shown with lines which are shorter than the $\frac{1}{2}$ inch lines. There is a quarter inch line on either side of each half inch line.) How long is the shortest strip to the nearest inch?" (The shortest strip, which is $3\frac{1}{4}$" long, is 3" to the nearest inch.)

Repeat this procedure using the other strips. Record the resulting measurements on the chalkboard as the students record the measurements in their notebooks.

STRATEGY 1: cont'd

e.g.,

MEASUREMENT TO THE NEAREST INCH		
Strip	Length	Length to the Nearest Inch
shortest	$3\frac{1}{4}"$	3"
longest	$9\frac{1}{4}"$	10"
middle	$6\frac{1}{4}"$	6"

3.10.06.04 **identify a foot as a unit of length and measure objects to the nearest foot**

STRATEGY 1: Prepare several sets of index cards and 12 inch rulers. On each index card write a distance to be measured or an item to be measured that is greater than 1 foot long.

e.g.,

Measure the distance from the door to the window.

Measure the height of the chalkboard.

Display a 12 inch ruler and say, "How long is this ruler? (It is 12 inches long.) Another way of saying 12 inches is one foot." Divide the students into groups. Give each group a set of index cards and 12 inch rulers. Say, "We will use the rulers to measure the objects or distances listed on the cards. Each object is longer than your ruler so you will have to place the ruler down more than once. Keep your place each time by making a line near the 12 inch mark on the ruler." Demonstrate the procedure.

Say, "How many inches are in 1 foot? (There are 12 inches in 1 foot.) If we divide 12 inches into 2 equal parts, how many inches will be in each part? (There will be 6 inches in each part.) When an

STRATEGY 1: cont'd

object is divided into 2 equal parts what fractional name can we give to each part? (Each part can be called one half.) When 12 inches are divided into 2 equal parts, each 6 inches may be called one half foot." On the chalkboard write 6 inches = $\frac{1}{2}$ foot.

Say, "When we are measuring an item to the nearest foot, it will sometimes measure less than 1 foot, 2 feet, or 3 feet but more than $1\frac{1}{2}$ feet, $2\frac{1}{2}$ feet, or $3\frac{1}{2}$ feet, e.g., a desk is slightly less than 3 feet long but more than $2\frac{1}{2}$ feet long. The desk is about 3 feet long. If an object measures slightly more than a foot but less than half a foot, we give the measurement to the lower foot, e.g., the seat of a chair is slightly more than one foot wide. It is about 1 foot wide."

Ask the students to exchange index cards and compare their measuring results.

3.10.06.05 **identify a yard as a unit of length and measure objects to the nearest yard**

STRATEGY 1: Prepare and distribute to groups of students yardsticks and rolls of adding machine tape. Say, "Sometimes we want to measure objects or distances which are very long. Why would it be better to measure in feet than in inches? (It would be faster to measure in feet. It is easier to just use a 12 inch ruler since twelve inches equal one foot.) If we want to measure very great distances, such as the distance from one end of the hallway to the other end there is a unit of measure that is longer than a foot. It is called a yard." Display a yardstick. To identify the approximate length of a

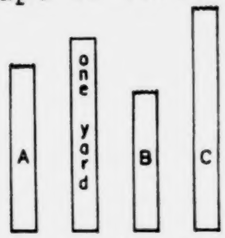
STRATEGY 1: yard discuss familiar reference points to which the students can relate.

e.g.,

- the width of the doorway
- the height of the door from the floor to the knob
- the height of a chalkboard

Ask the students in each group to tear off a strip of adding machine tape which they estimate to be one yard in length, write their names on their strip and tape it vertically to the chalkboard.

e.g.,



Use the yardstick to measure each strip. Say, "How does the length of your strip of tape compare to the length of the yardstick?" (Strip A is almost a yard long. Strip B is a little less than a yard long. Strip C is more than a yard long.)

Repeat this procedure with the other strips. Say, "When would you select a yard as a unit of measure?" (I would select a yard as a unit of measure when I have to measure lengths and distances greater than those that can be easily measured by inches and feet.) Can you give me some examples?" (I would use an inch to measure the length of a pen, a foot to measure a person's height and a yard to measure the length of a hallway.)

Ask the students to measure a variety of distances and objects for which it would be appropriate to measure in yards. Record these measurements on the chalkboard as the students record them in their notebooks.

3.10.06

STRATEGY 1: cont'd

Adapt Strategies from P.O.'s 3.10.06.01 through 3.10.06.04 for measuring to the nearest yard. e.g.,

MEASURING TO THE NEAREST YARD

Item or Distance	Length
width of chalkboard	5 yards
distance from room 220 to room 222	10 yards
width of bulletin board	3 yards

3.10.06.06 **identify the numerical relationships among inch, foot, and yard**

STRATEGY 1: Prepare and distribute a 12 inch ruler to each student. Display a yardstick. Say, "Count the number of inches on your ruler. How many inches are there in one foot?" (There are 12 inches in 1 foot.)

On the chalkboard write 12 inches = 1 foot. Display the yardstick. Say, "What kind of ruler is this? (It is a yardstick. It is one yard long.) How many feet are there in one yard?" Ask a student to use a 12 inch (1 foot) ruler to count the number of feet in a yard. Say, "How many feet equal 1 yard?" (3 feet equal 1 yard.) On the chalkboard write 3 feet = 1 yard. Display the 12 inch ruler. Ask a student to place 12 inch rulers along the yardstick from end to end. Say, "How many rulers were placed along the yardstick? (3 rulers were placed along the yardstick.) How many inches long is each ruler? (Each ruler is 12 inches long.) If each ruler is 12 inches long and 3 rulers were placed side by side on the yardstick, how many inches are in 1 yard? (There are 36 inches in 1 yard.) How did you determine that?" (Accept all appropriate responses, e.g., I added 12

STRATEGY 1: cont'd

plus 12 plus 12 and got a sum of 36. I counted all the inches one by one to get 36.) On the chalkboard write 36 inches = 1 yard.

Ask the students to record this information in their notebooks as it is recorded on the chalkboard.

e.g.,

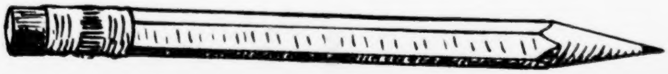
12 inches = 1 foot
3 feet = 1 yard
36 inches = 1 yard

P.O. 3.10.06.01 - .02

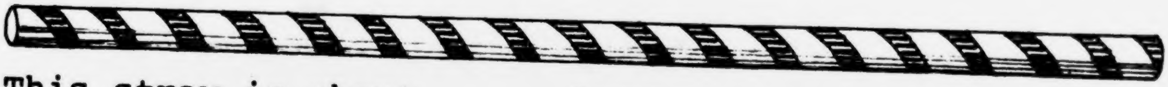
NAME:________________________________CLASS:________DATE:______

Follow the directions below.

Measure each object to the nearest inch and record its length.

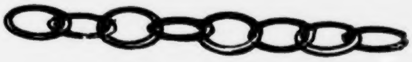


This pencil is about _____ long.



This straw is about _____ long.

This pen is about _____ long.



This chain is about _____ long.

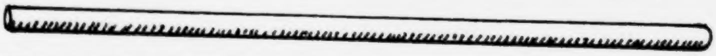
Use the ruler below to measure the length of each stick to the nearest half inch.

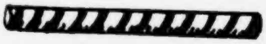
The shortest stick is about ____ inches long.

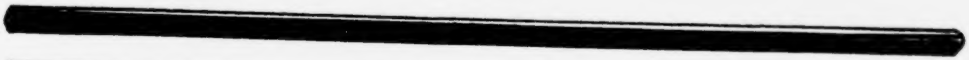
The black stick is about ____ inches long.

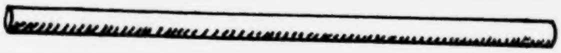
Stick D is about ____ inches long.

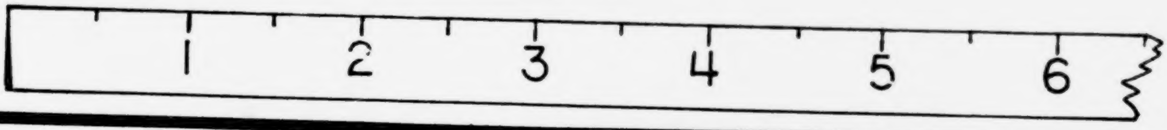
Stick A is about ____ inches long.

A. 

B. 

C. 

D. 

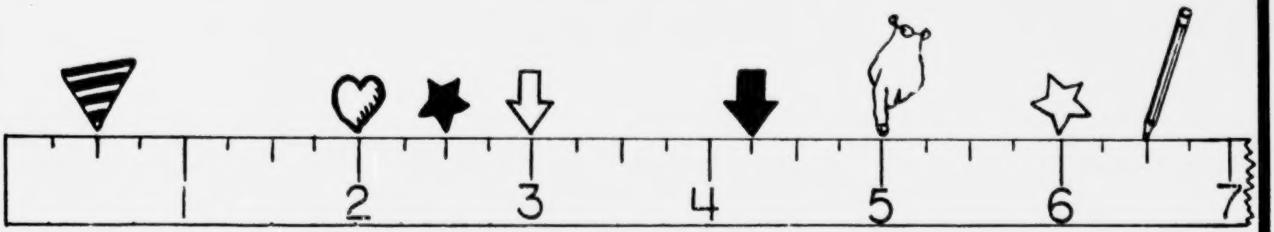


P.O. 3.10.06.01 - .03

NAME: ______________________ CLASS: ________ DATE: _______

Follow the directions below.

Several pictures are located along the edge of the ruler. Indicate the point at which each picture is located.



⇩ 3" ☆ ___ 👇 ___ ♡ ___

⬇ ___ ★ ___ ✏ ___ ◣ ___

Write > or < for each sentence.

$1\frac{1}{2}''$ (<) $1\frac{3}{4}''$ $7'' \bigcirc 6\frac{1}{4}''$ $9\frac{1}{4}'' \bigcirc 8\frac{3}{4}''$

$3\frac{3}{4}'' \bigcirc 4''$ $5\frac{1}{2}'' \bigcirc 5\frac{1}{4}''$ $10'' \bigcirc 9\frac{1}{4}''$

Do you remember? Circle the even numbers. Complete each sentence.

[✓ 4], 7, 13, 28, 62, 115, 260, 711, 4114

When subtracting an even number from an odd number, the difference is __________ .

The sum of two odd numbers is an __________ number.

The difference between two odd numbers is an __________ number.

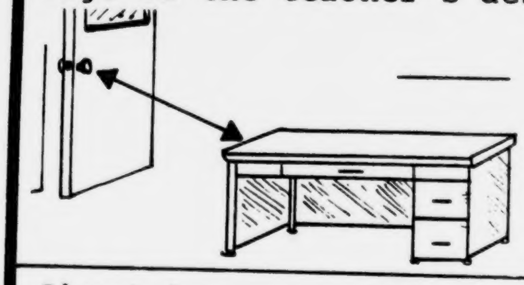
The sum of an odd number and an even number is an __________ number.

P.O. 3.10.06.04-.06

NAME: ______________________________ CLASS: __________ DATE: ________

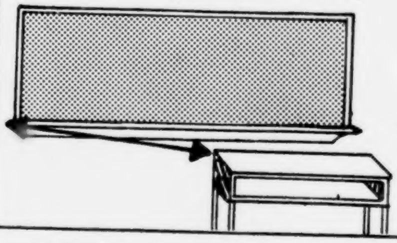
Use your classroom and your classmates to answer the questions below.

What is the distance, in feet, from the door knob to the top edge of the teacher's desk?



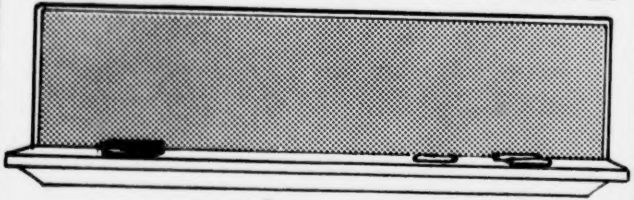
_____ feet

What is the distance, in feet, from the lower left edge of the chalkboard to the left edge of your desk?



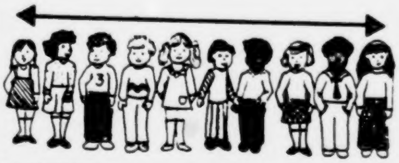
_____ feet

About how many yards long is the chalkboard? How many feet long is the chalkboard?



_____ yards _____ feet

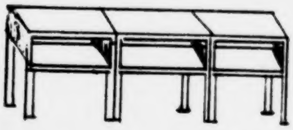
If ten students stand shoulder to shoulder, what is the distance from the first student to the last?



_____ feet

_____ yards

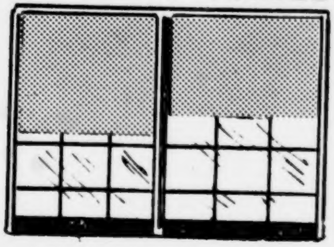
Push three desks together. About how many yards long are they altogether? About how many feet long are they altogether?



_____ yards

_____ feet

About how many yards wide are two classroom windows?



_____ yards

Complete each sentence.

If 1 foot = 12 inches, then 2 feet = _____ inches.

If 2 feet = 24 inches, then _____ feet = 36 inches.

If 1 yard = 3 feet, then 2 yards = _____ feet.

If 3 yards = _____ feet, then 4 yards = _____ feet.

If 36 inches = 1 yard, then 36 inches = _____ feet.

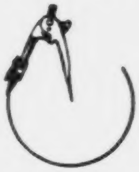
3.09.02 CONSTRUCTION OF PLANE FIGURES

(1 lesson)

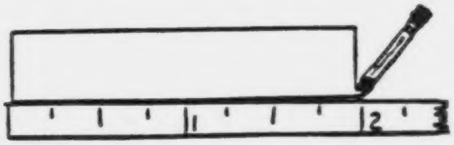
PERFORMANCE OBJECTIVES

The student will be able to...

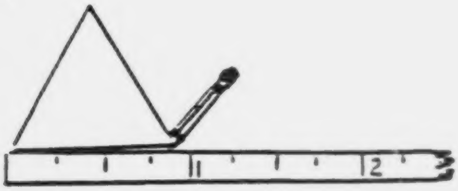
3.09.02.01B use a compass and/or a protractor to construct circles;
e.g.,



3.09.02.02B use a ruler to construct rectangles and squares;
e.g.,



3.09.02.03B use a ruler to construct triangles.
e.g.,



3.09.02

VOCABULARY

TERMS

compass
protractor

GETTING STARTED 1:

Prepare and display several charts, each with clues describing a plane figure which has been drawn on the opposite side of the chart. Divide the students into two groups. Say, "Each chart has a plane figure drawn on one side and a list of clues which describes the figure on the other side."
e.g.,

CLUES

1. It is a plane figure.
2. It is formed with line segments.
3. It has 4 sides.
4. It has 4 corners.
5. All of its sides are equal in length.

CLUES

1. It is a plane figure.
2. It has no corners.
3. It has no straight sides.

CLUES

1. I am a plane figure.
2. I have straight sides.
3. I have fewer sides than a rectangle.
4. I have 3 corners.

CLUES

1. I am a plane figure.
2. I have straight sides.
3. I have 4 sides.
4. I have 4 corners.
5. The opposite sides are equal in length.

GETTING STARTED 1: cont'd

Say, "I will reveal one clue at a time to each team. The first team to name the plane figure will earn one point. A bonus point will be given for drawing the plane figure on the chalkboard. The team with the most points wins."

GETTING STARTED 2:

Prepare several large bags, each containing several sizes of circles, squares, rectangles, and triangles. Distribute 1 bag of shapes to each group of students. Ask the students to sort and arrange the shapes. Say, "How did you arrange the shapes?" (Accept all reasonable responses, e.g., We arranged the shapes in 3 groups; 3-sided figures, 4-sided figures, and circles. We arranged the shapes in 4 groups; triangles, rectangles, squares, and circles.) Ask the students to identify items in the classroom which represent circles, triangles, rectangles, and squares.

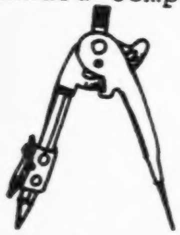
NOTE: Squares are rectangles which have 4 equal sides.

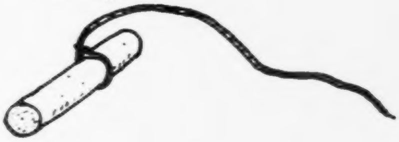
3.09.02

3.09.02.01 **use a compass and/or a protractor to construct circles**

STRATEGY 1: Prepare a protractor, several standard compasses, and several compasses made with pencils or chalk and string.

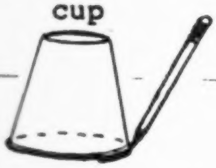
e.g.,

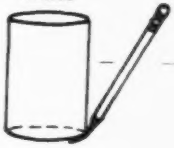

standard compass

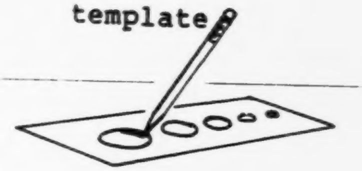

chalk and string compass

Prepare and distribute objects which may be used for drawing circles.

e.g.,


cup


can


template

Ask the students to draw several circles using a variety of objects. Say, "You have drawn circles by tracing the outside edge of a circular object. The outside edge of a circle is called the circumference. Another way to draw circles is with a compass." Display a standard compass and a chalk and string or a pencil and string compass. Say, "Although these objects look different, they are all compasses and are used to draw circles. I will demonstrate the use of each compass." Use the chalk and string compass at the chalkboard. Place the string on the chalkboard and hold it fast with your finger. Say, "The point at which I am holding the string will be the center of the circle." Hold the string taut and draw an arc first in one direction and then in the other direction until a circle is drawn. Say, "How can I use this compass to draw a smaller circle? ... a

STRATEGY 1: cont'd

larger circle?" (To draw a smaller circle shorten the string. To draw a larger circle lengthen the string.) Demonstrate.

Display a standard compass. Say, "This is a standard compass. We use this compass when we want to draw a circle having a given length from its center to the perimeter. There is a kind of ruler on this compass which can be used for measuring this distance." The students should be given an opportunity to experiment with both the standard compass and the chalk and string or pencil and string compasses.

Say, "How is drawing a circle with a compass different than drawing a circle with a cup or a template?" (When using a compass, we know where the center of the circle is located without folding it into 4 equal parts. The mark left by the point of the compass is the center of the circle. When using a compass, we can make the circle any size we want. When using a cup or a template, we can make circles only the size of these items.)

Display a protractor. Say, "Another tool we can use to draw a circle is called a protractor." Elicit from the students how a protractor could be used. Ask a student to demonstrate at the chalkboard. Say, "When using a protractor to make a circle, what size will the circle be?" (The circle will be two times the size of the outer edge of the protractor.)

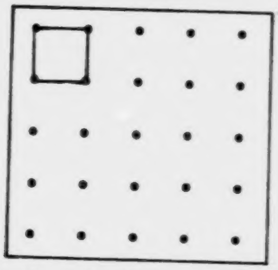
NOTE: The students' success will vary depending upon their maturity and dexterity. Standard compasses should be used with caution. The Triman compass is a replacement for the sharp-pointed compass. It is capable of producing perfect circles and can be used with pencils, pens and felt tip pens.

3.09.02.02 use a ruler to construct rectangles and squares

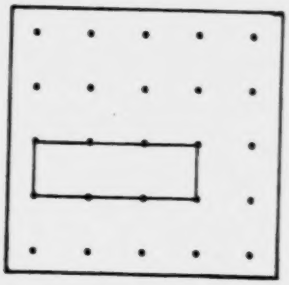
STRATEGY 1: Prepare geoboards, dot paper, rubber bands, and rulers. Distribute the materials to each student or

STRATEGY 1:
cont'd

group of students. Ask a student to come to the chalkboard to work at a model of a geoboard. Ask the other students to use rubber bands to construct the smallest possible square on the geoboard and then to draw it on the dot paper using a ruler.
e.g.,



Ask the student at the chalkboard to use a ruler to construct a rectangle whose longer sides cover 3 units (•—•—•—•) and whose shorter sides cover 1 unit (•—•).
e.g.,



Ask the students at their seats to construct a 3 by 1 rectangle on their geoboards using the rubber band and a 3 by 1 rectangle on the dot paper using a ruler.

Repeat this procedure for different sized squares and rectangles.

Say, "How are squares and rectangles the same? (They are drawn with straight lines, they have 4 sides, and they have 4 corners.) How are squares and rectangles different? (The 4 sides of a square are equal in length. A rectangle has 2 long sides and 2 short sides.) Why do we use a ruler to draw rectangles?" (A ruler is used to draw straight sides.)

NOTE: Centimeter graph paper and centimeter rulers are useful for drawing rectangles and reinforcing

STRATEGY 1: cont'd

linear metric measurement. One inch graph paper and rulers calibrated in inches are useful for drawing rectangles and reinforcing standard linear measurement.

3.09.02.03 **use a ruler to construct triangles**

STRATEGY 1: Prepare and distribute alphabetized dot paper and rulers.

e.g.

A	B	C	D	E
F	G	H	I	J
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y

Use an enlarged model to demonstrate at the chalkboard. Say, "Which line segments can I join to draw the smallest triangle? (Accept all reasonable responses, e.g., $\overline{AB}$, $\overline{BF}$ and $\overline{FA}$ can be joined to draw the smallest triangle.) Are there other line segments which I could join to form triangles? (Accept all reasonable responses, e.g., $\overline{AM}$, $\overline{MC}$, $\overline{CA}$ or $\overline{NW}$, $\overline{WK}$, $\overline{KN}$ ...) Use your ruler to connect line segments $\overline{AM}$, $\overline{MC}$, and $\overline{CA}$. Can we draw triangles by naming the points instead of naming each segment? Explain. (Yes, any 3 points will form a triangle as long as 1 of the points is on a different vertical or horizontal line.) If we connect the points at letters K, M, and O, can we draw a triangle? (No, all 3 points are lined up horizontally on the chart.) Why can we draw a triangle by connecting points K, V, and M?" (Points K, V, and M are not along the same horizontal or vertical line.) Ask the students to use their rulers to connect points, K and V, V and M,

STRATEGY 1: cont'd

M and K. Ask the students to search and discover points whose letters form names or words which, when connected, form triangles, e.g., DIE, JIM, MAP ...

NOTE: Graph paper and rulers may be used to draw triangles. Draw rectangles and bisect them diagonally, or place dots where the vertical and horizontal lines cross, and connect any 3 points making sure that 1 of the 3 points forming the triangle is on a different horizontal or vertical line.

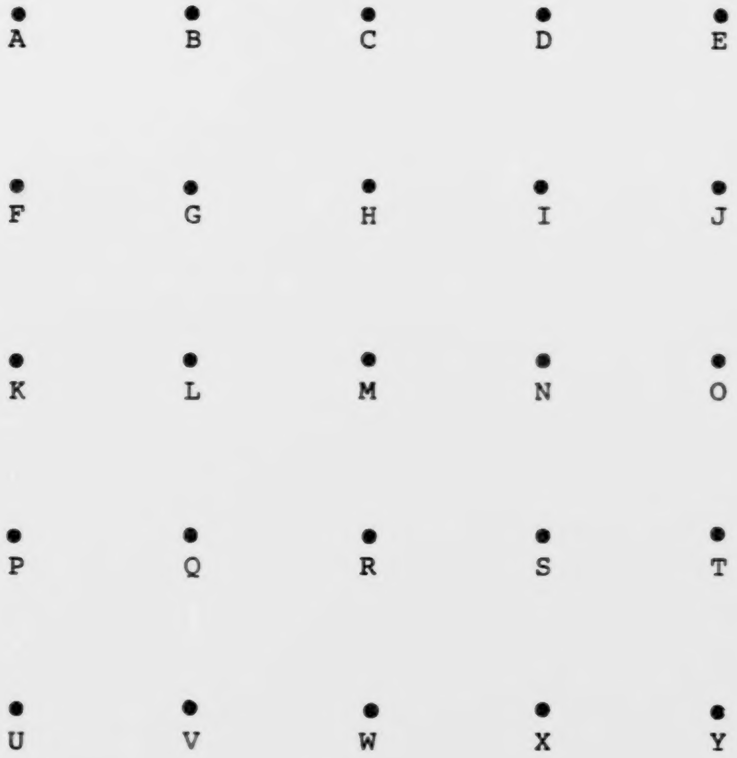
P.O. 3.09.02.01

NAME:________________________ CLASS:________ DATE:_______

Follow the directions below.

Place the point of a compass on point M and the compass pencil on point O. Draw a circle. Through which 4 points does the circle pass?

point ____, point ____, point ____, point ____



CHALLENGE!

- **Draw a circle which is double the size of the circle above.**
- **Draw a circle which is one-half the size of the circle above.**

P.O. 3.09.02.02-.03

NAME:______________________________ CLASS:__________ DATE:________

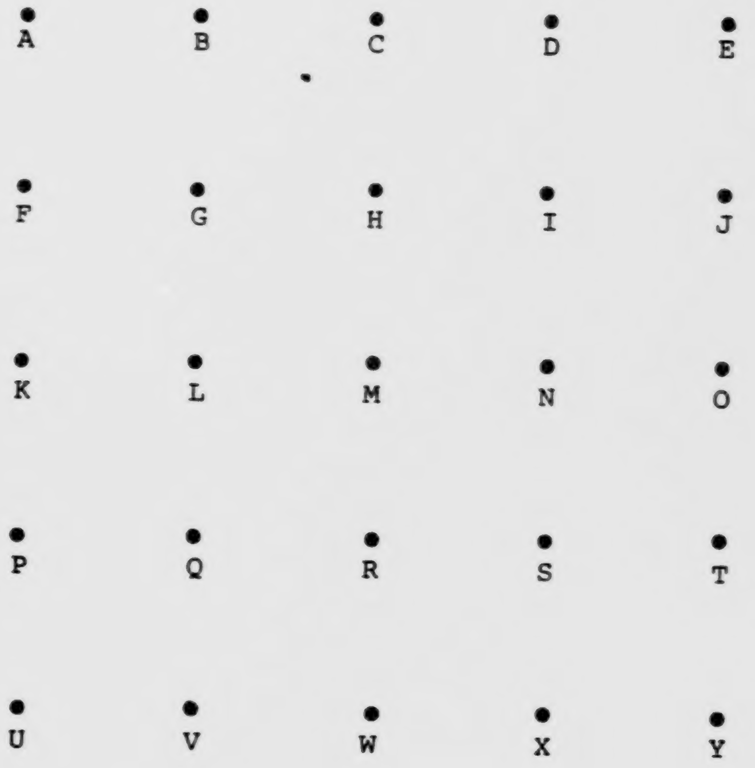
Follow the directions below.

1. Use a ruler to draw $\overline{AB}$, $\overline{BG}$, $\overline{GF}$, and $\overline{FA}$.
   This figure is called a ____________________.

2. Use a ruler to draw $\overline{CE}$, $\overline{EJ}$, $\overline{JH}$, and $\overline{HC}$.
   This figure is called a ____________________.

3. Use a ruler to join points M, U, and W.
   This figure is called a ____________________.

4. Use 3 points to make the smallest possible triangle.
   What points did you join? __________________________

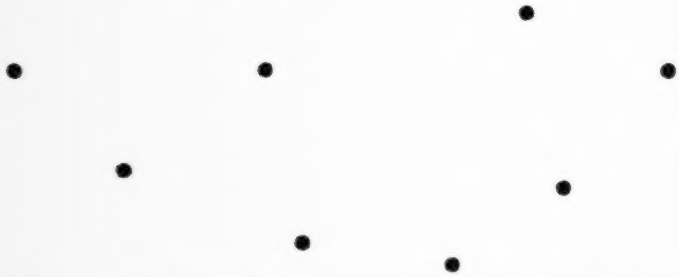


SHARPENING YOUR SKILLS

Units 36, 37

Name: ______________________ **Class:** __________ **Date:** __________

1. Connect 4 dots to make a rectangle. Use a ruler.



2. 2 yards = ___ feet.

ⓐ 8 ⓒ $\frac{1}{2}$

ⓑ 2 ⓓ 6

3. 24 inches = ___ feet.

ⓔ 1 ⓖ 2

ⓕ 6 ⓗ 24

4. 5 yards = ___ feet.

ⓐ 15 ⓒ 6

ⓑ 6 ⓓ 10

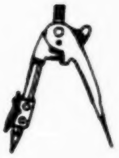
5. Circle the items below which could be $\frac{1}{2}$ inch long.

a coin a boy

a notebook an insect

a screw a flower petal

6. Robert used a compass to draw a shape. What shape did he draw?



ⓔ triangle ⓖ circle

ⓕ rectangle ⓗ square

7. Complete each sentence with the word foot, feet, yard, or yards.

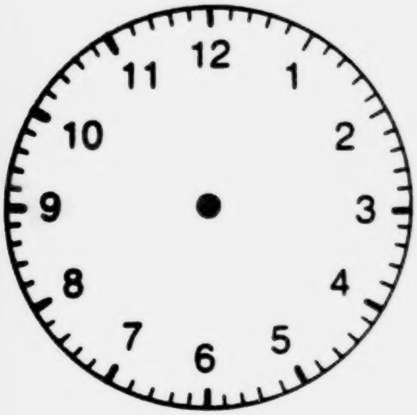
A 12 inch ruler equals 1 _____.

A teacher's desk is about 1 ____ long.

The height of a door is about 7 ____.

A car is about 4 _____ long.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday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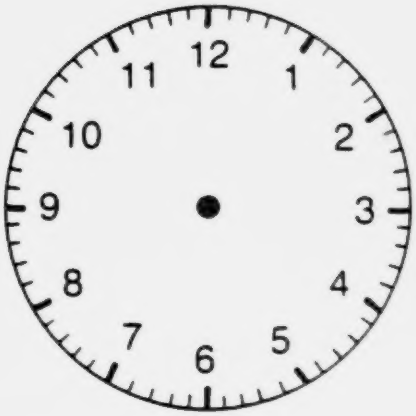
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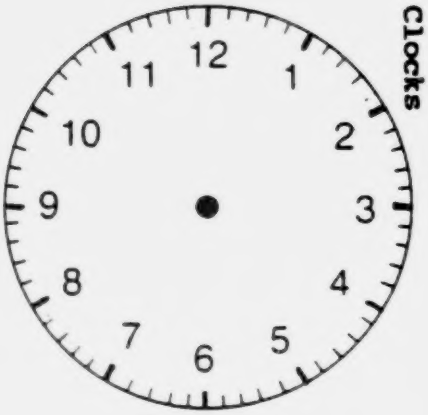
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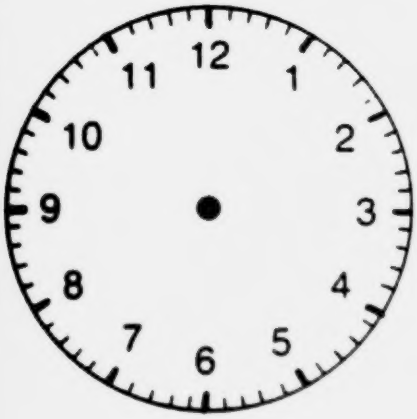
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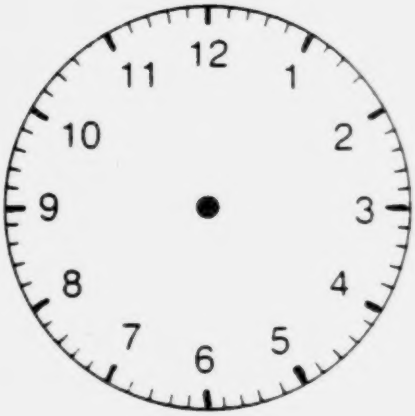
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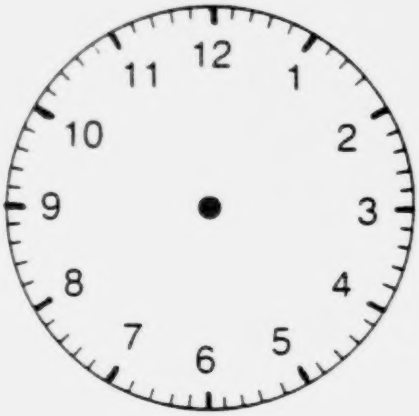
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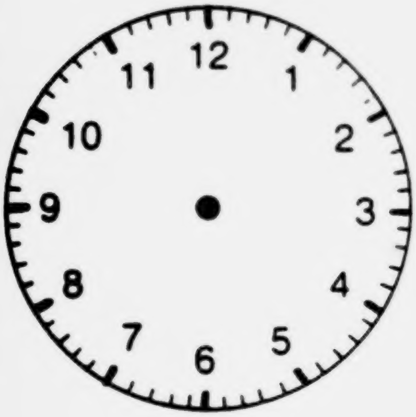
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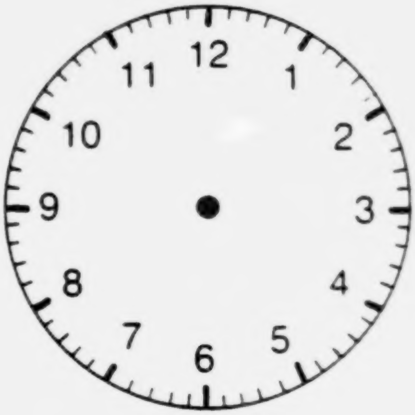
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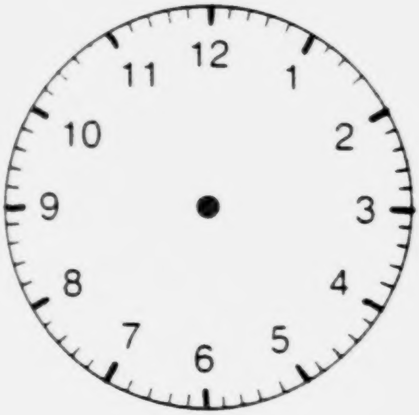
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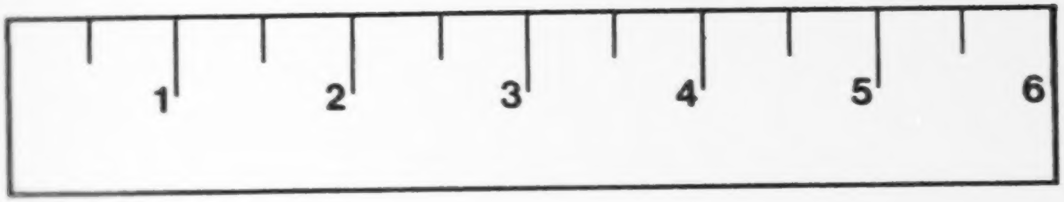
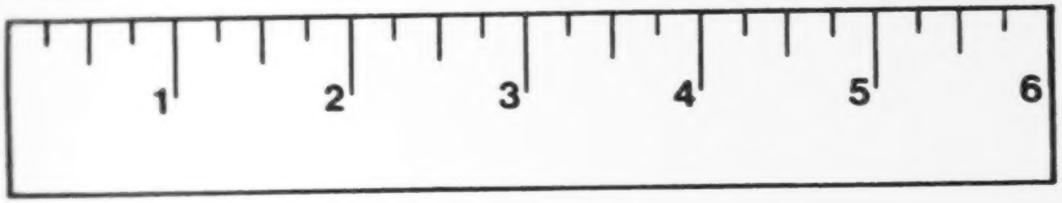
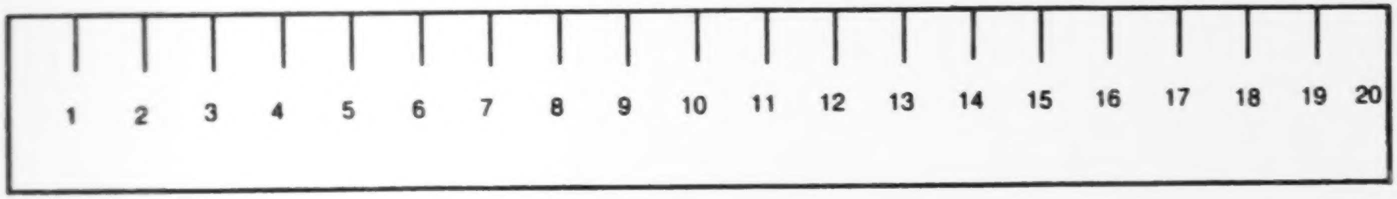
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

RESOURCE MATERIAL - Dot Paper (1) Geometry

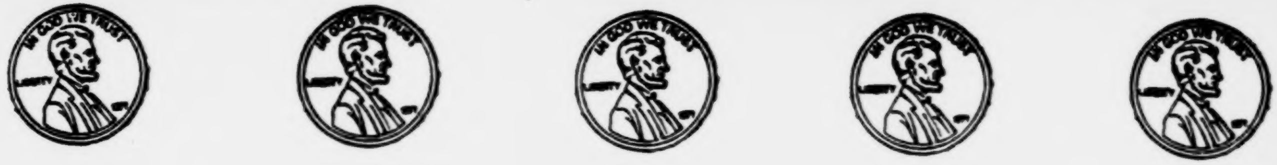
RESOURCE MATERIAL - Dot Paper (2) Geometry

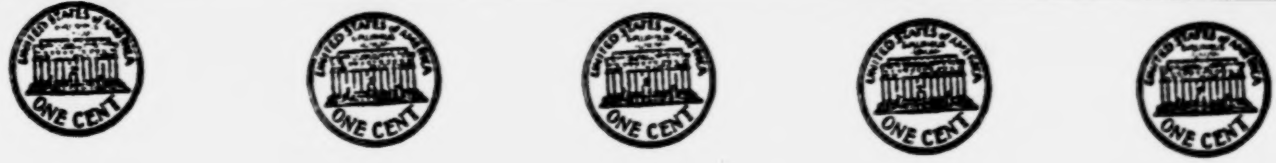






RESOURCE MATERIAL - Money (1)


IN GOD WE TRUST
LIBERTY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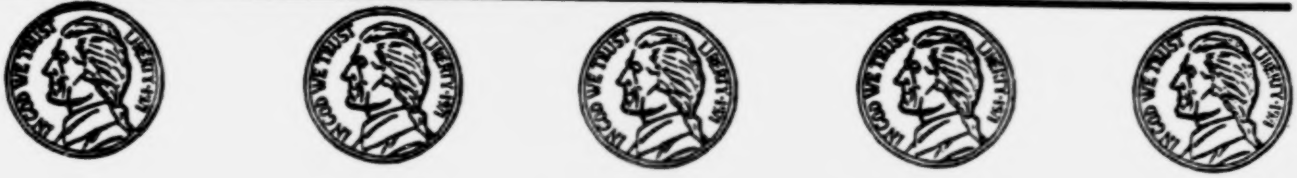
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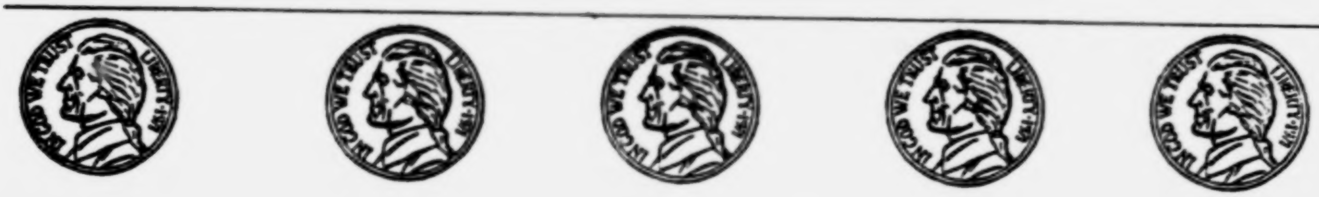
LIBERTY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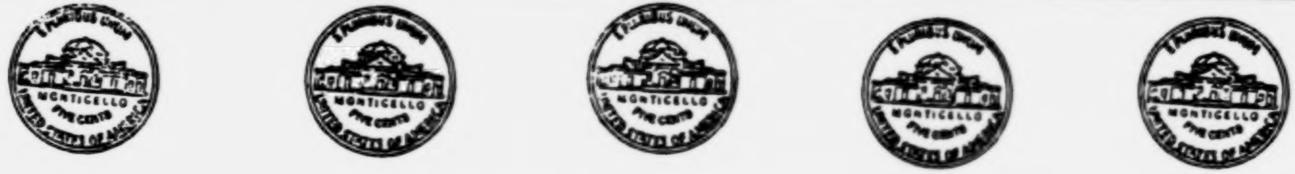
LIBERTY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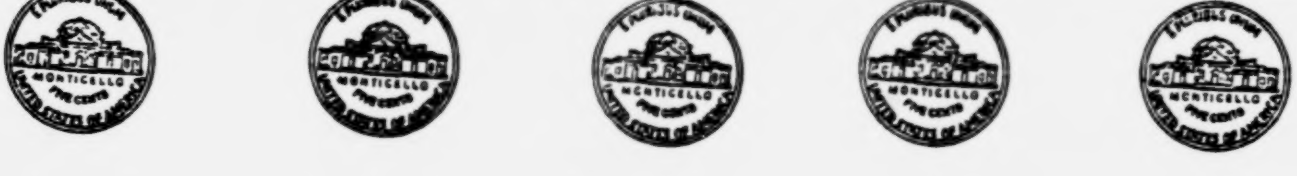
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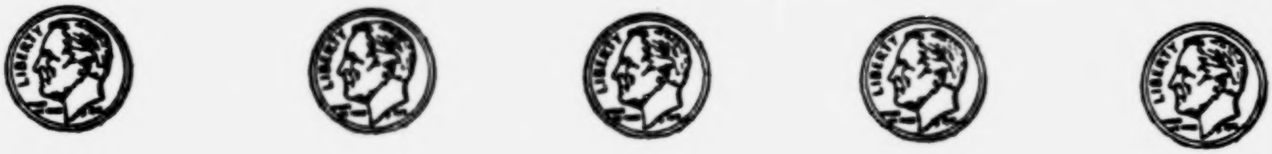

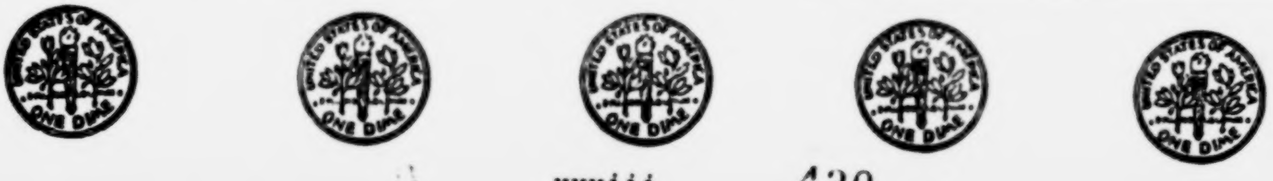
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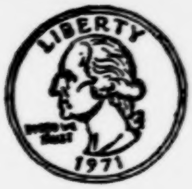
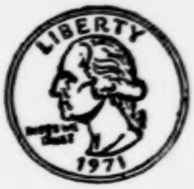

LIBERTY
IN GOD WE TRUST
1971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IN GOD WE TRUST
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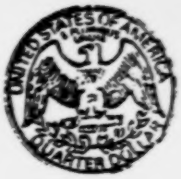
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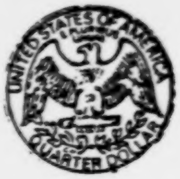
QUARTER DOLLAR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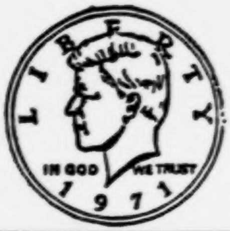
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IN GOD WE TRUST
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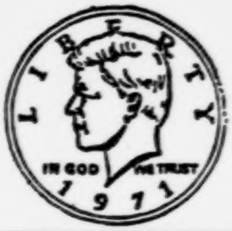
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IN GOD WE TRUST
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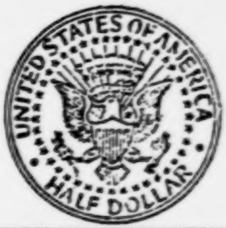
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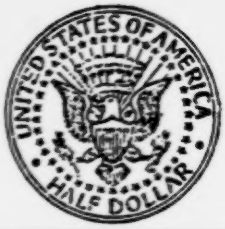
HALF DOLLAR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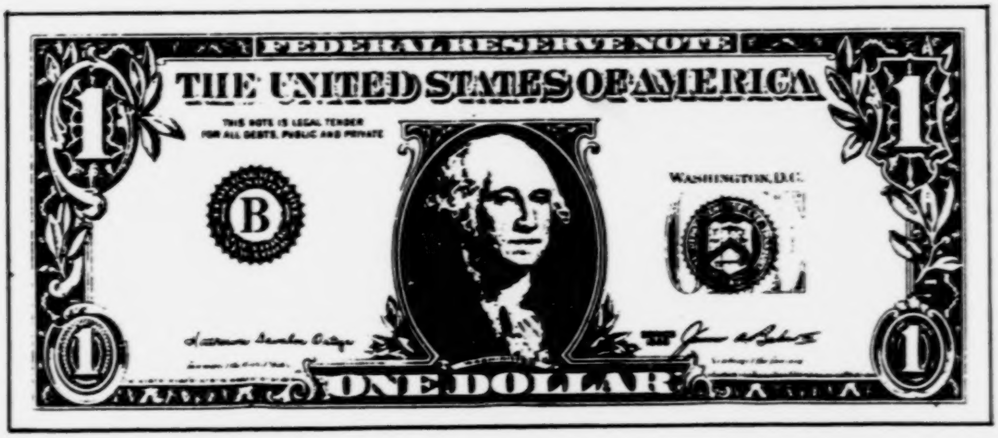
FEDERAL RESERVE NOTE
THE UNITED STATES OF AMERICA
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
B
WASHINGTON, D.C.
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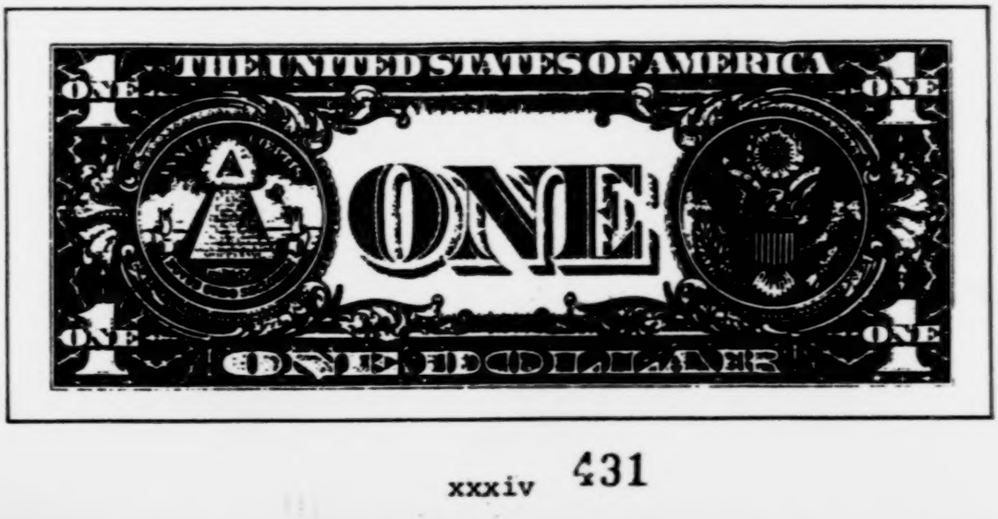
THE UNITED STATES OF AMERICA
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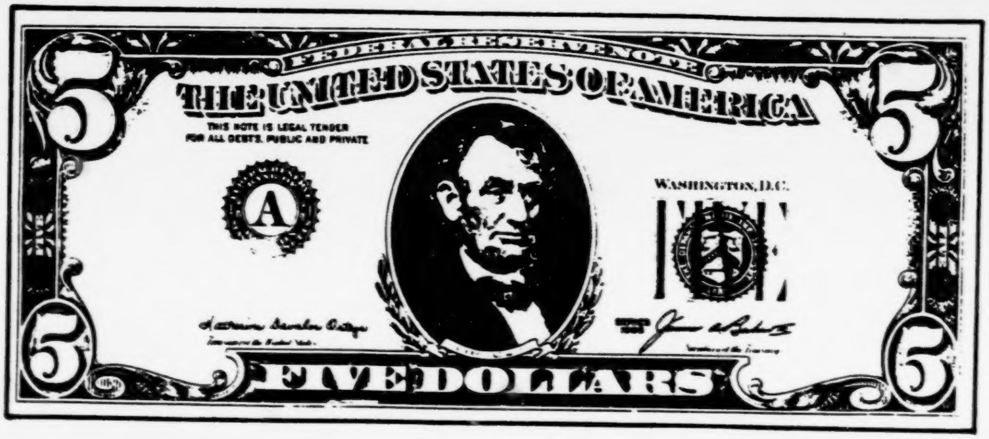
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THE UNITED STATES OF AMERICA
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
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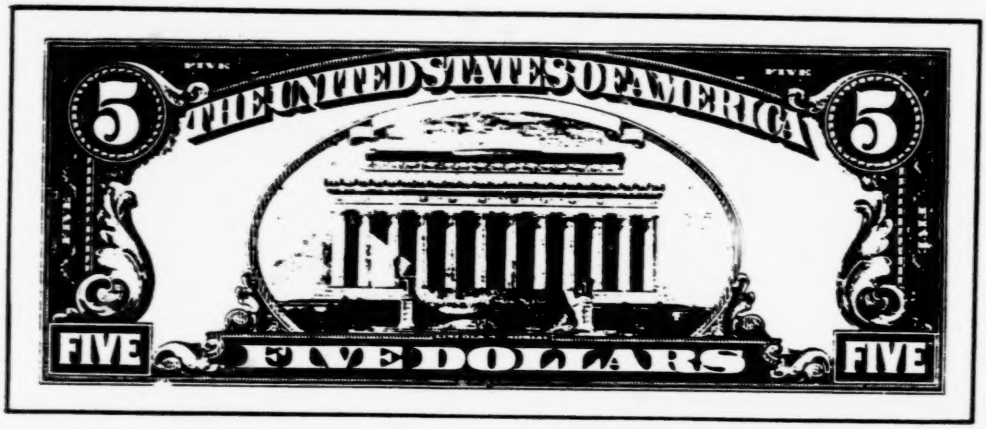
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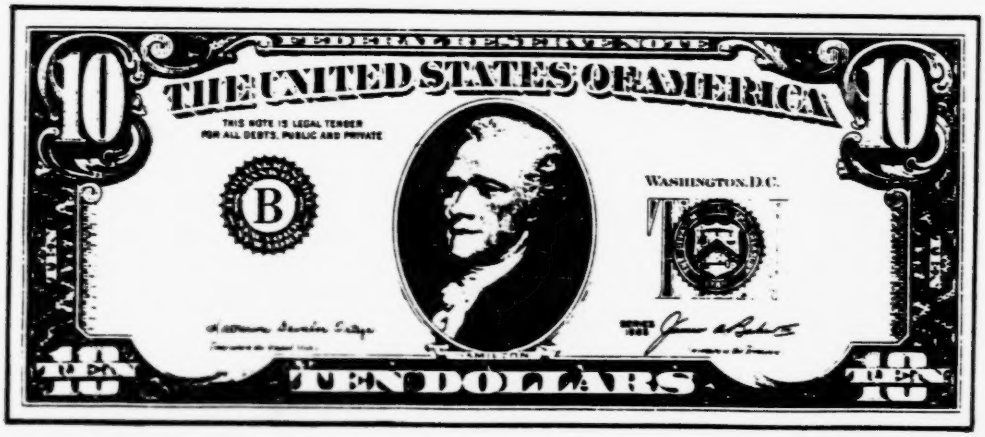
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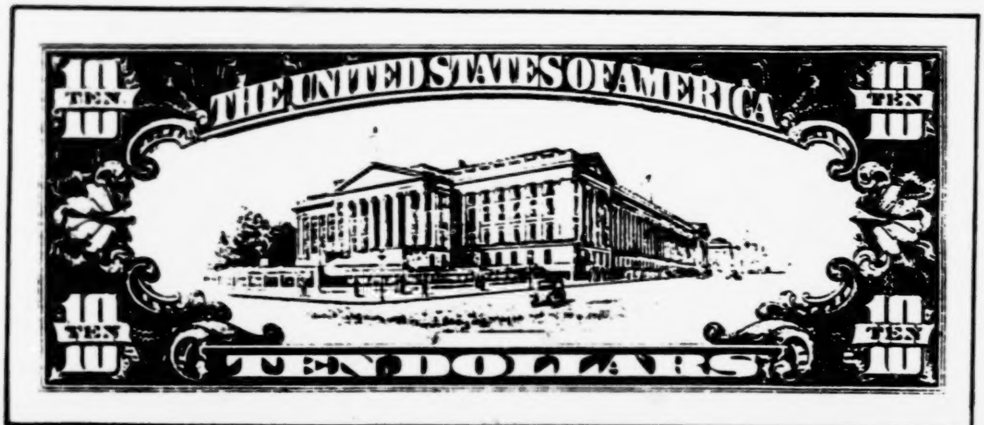
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THE UNITED STATES OF AMERICA
TEN DOLLARS

TABLE OF SYMBOLS

DEFINITIONS	SYMBOL	DEFINITIONS	SYMBOL
plus; add; positive	+	line	↔
minus; subtract; negative	-	ray	→
plus or minus	+ or -	perpendicular lines	⊥
times; multiply	· or X	parallel lines	∥
divide	÷	degree	°
divide	⟌	equals	=
square root	√	is not equal to	≠
cube root	∛	is less than	<
angle	∢	is greater than	>
between two numerals or letters at the end of a series or sequence; and so on	...	encloses a set when numbers are included: empty set when empty	{ }
		subset	⊂
triangle	△	intersection	∩
rectangle	▭	union; join	∪
parallelogram	▱	percent	%
circle	⊙	foot, minute	'
		inch, second	"
line segment (as $\overline{AB}$)	—		

METRIC TABLE

PREFIX	VALUE	LENGTH	CAPACITY	WEIGHT (MASS)
KILO	1000	kilometer* (km)	kiloliter (kl)	kilogram* (kg)
HECTO	100	hectometer (hm)	hectoliter (hl)	hectogram (hg)
DEKA	10	dekameter (dam)	dekaliter (dal)	dekagram (dag)
	1	meter* (m)	liter* (l)	gram* (g)
DECI	$\frac{1}{10}$ or .10	decimeter (dm)	deciliter (dl)	decigram (dg)
CENTI	$\frac{1}{100}$ or .01	centimeter* (cm)	centiliter (cl)	centigram (cg)
MILLI	$\frac{1}{1000}$ or .001	millimeter* (mm)	milliliter (ml)	milligram* (mg)

* most frequently used

BASIC CLASSROOM EQUIPMENT CHECKLIST

MATERIALS:

Abacus - Class size/indiv....... ____

Attribute blocks................ ____

Balance Beam.................... ____

Calculators..................... ____

Calendar - class size........... ____

Clock - large - class size...... ____

Clock - individual size......... ____

Clock - stamp................... ____

Coin stamps..................... ____

Compass......................... ____

Cubic counting blocks........... ____

Cuisenaire rods................. ____

Dominoes........................ ____

Felt cut-outs................... ____

Flannel board................... ____

Flash cards..................... ____

Fractional parts (assorted)..... ____

Geo boards...................... ____

Geometric patterns.............. ____

Hundred charts - class size/ind. ____

Interlocking cubes.............. ____

Laminating paper................ ____

Magnetic board.................. ____

Magnetic discs.................. ____

Measuring tools-English, Metric (rulers, scales, compasses, protractors, beakers, cups, spoons, thermometers).......... ____

Number lines - class/indiv...... ____

Numerals - tactile.............. ____

Plastic discs................... ____

Play money...................... ____

Powers of Ten................... ____

Protractor...................... ____

SEE calculators................. ____

Scale........................... ____

Screen (pull-down type)......... ____

Spinners........................ ____

Squared place value material.... ____

Standard playing cards.......... ____

Tangrams........................ ____

Tens frame...................... ____

Timers (1,2,3 minute)........... ____

Tokens (various sizes/colors)... ____

Trundle wheel................... ____

SUPPLIES:

Adding machine tapes (for classroom/ind. number lines)...... ____

Chalk........................... ____

Construction paper.............. ____

Elastic bands................... ____

BASIC CLASSROOM EQUIPMENT CHECKLIST

SUPPLIES: cont'd

Envelopes (all sizes).......... ____

Erasers, board/individual...... ____

Felt pens (all sizes).......... ____

Ditto, Rexograph paper......... ____

Glue........................... ____

Gram weights................... ____

Graph paper (1 cm, ¼, 1")...... ____

Grease pencils................. ____

Oak tag........................ ____

Paper clips.................... ____

Paste.......................... ____

Plastic discs.................. ____

Pointer........................ ____

Primary pencils................ ____

Rubber bands................... ____

Scissors - primary, left hand.. ____

Scotch tape.................... ____

Spinner........................ ____

String......................... ____

Tape........................... ____

COLLECTIBLES:

Beads and beans................ ____

Bottle caps.................... ____

Buttons........................ ____

Cardboard (all sizes).......... ____

Cereal boxes................... ____

Coffee cans.................... ____

Detergent boxes, shoe boxes, meat trays, and plastic containers.................. ____

Egg cartons.................... ____

Felt for desk mats............. ____

Ice cream sticks............... ____

Juice containers............... ____

Macaroni....................... ____

Magazines...................... ____

Menus.......................... ____

Metrically measured cartons.... ____

Milk containers................ ____

Newspapers..................... ____

Paper plates................... ____

Sand........................... ____

Spools......................... ____

String, yarn................... ____

Styrofoam...................... ____

Tongue depressors.............. ____

Wire hangers................... ____

Ziploc Bags.................... ____